

For Tandy's 100
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and 1000, 1200, 2000 and
3000 MS-DOS Computers

PCM

The Personal Computer Magazine
for Tandy® Computer Users

Vol. III No. 6
December 1985
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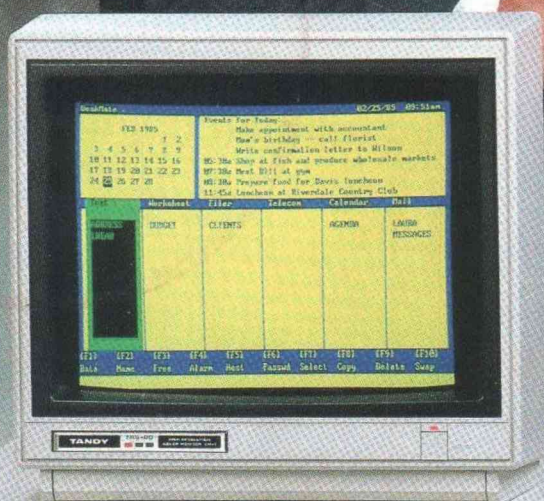
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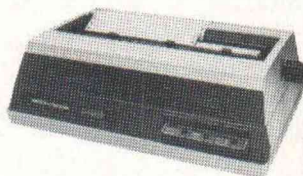
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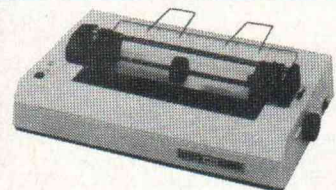
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Tandy MS-DOS Software Comparison Chart

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Indexes per file	1	7	12 ✓
Number of digits per numeric field	20	10	24 ✓
Number of files usable concurrently	1	2	10 ✓
Files span multiple drives	no	no	up to 8 ✓
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'Covering' Tandy

We think this marks the first time that John Roach, President and Board Chairman of Tandy Corp., has been featured on the cover of a computer magazine. As a leader in the world of business, John has been on magazine covers before; it's just that as best we can tell, this is his computer magazine cover debut.

I happen to think we're entirely justified in using John as a "cover boy." You will note that with him are two new Tandy computers. And what computers they are!

Inside this issue, you will read exclusive information about the new portable Tandy 600 and the new Tandy 3000. We are very excited about both. At a special preview for PCM in Fort Worth several weeks ago, managing editor Danny Humphress and I were blown away by the screen display of the 600 and the sheer speed of the 3000. And, since both fit into our stated "coverage" of Tandy products — portables and MS-DOS machines — you'll be finding more things here in the months to come.

I have looked at a huge number of 80-column display portables in the past year. Invariably, they were difficult to read in "normal" light conditions. Such is not the case with the 600 — a fact that, I happen to think, will make this one a big seller for those who need an 80-column capability.

Back a lot of years ago I got tagged as the "stock car racing writer" for United Press International. After some time, I absorbed the lore, and one of the

names which always intrigued me was that of Curtis Turner, who was known as "ol' leadfoot." Ol' Leadfoot Curtis just put the pedal to the metal (as they said in CB days) and went flat-out.

I digress to this because I think the Tandy 3000 should be dubbed "Ol' Leadfoot," too. I have *never* seen a microcomputer operate as fast as it does. Heck, I loaded BASIC into it for five minutes, over and over again, just to see whether my eyes were deceiving me!

Trot down to your Tandy Computer Center and take a look at the 3000's high resolution graphics. Outstanding. Here we have an IBM AT compatible that goes the AT a lot better, but is still compatible.

If you think that is good news, try this on. A price of \$2,599 for a floppy disk version and just \$1,000 more for a 20 meg hard disk version! If you want a big-time, super-fast, graphically-superior numbered-cruncher, there's just no way to go but the 3000! I've already ordered one! To borrow a phrase, it is "Clearly Superior" in every way.

For months I've been pestering everyone who reads this column to tell everyone they know about the Tandy 1000. Now I have another reason. The best buy on the market just got better — at least through the Holiday selling season.

Between October 28 and December 25, you can buy a 128K, single-disk Tandy 1000 for \$999 — *including* their

new CM-4 color monitor! What a deal. As I said, this makes the best even better.

Also on special for the holidays are the Tandy 200 at \$799 and the 24K Tandy 100 at \$499.

If Tandy is making deals, can we at PCM afford to be left by the wayside? I suppose not. So, here is a deal to ensure that you get your next year's worth of PCM at the present subscription price and a set of binders to store them in, too.

If you renew your subscription to PCM by December 31, 1985, at the present rate (\$28 in the United States, U.S. \$35 in Canada, U.S. \$64 other foreign surface mail and U.S. \$85 other foreign air mail), you will be able to purchase a PCM binder for \$6, a savings of 20 percent off the regular price of \$7.50 (plus \$2.50 shipping and handling via UPS or \$4.50 shipping and handling to a post office box or foreign address).

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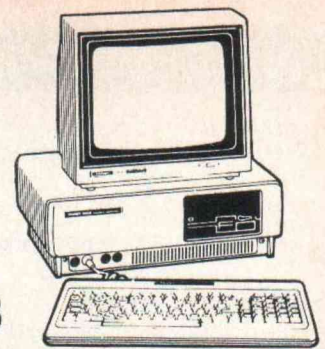
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— Lonnie Falk

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PRINTER PROBLEMS

Editor:

This is in response to a letter from C.F. Thompson and your reply published in the August 1985 issue of PCM.

I, too, own both a Color Computer and a Tandy 1000. The printer problem described by C.F. Thompson with the DMP 200 is identical to my problem with the Line Printer VIII — it continues to work just fine with my Color Computer but randomly prints double characters when used with the Tandy 1000. My sister's DMP 200 does the same thing, so this is not an isolated problem. Furthermore, I have no problem with my Smith Corona electronic typewriter with parallel and serial interface (it works very well with either computer), so I assumed the fault lies in the printer.

After the problem was confirmed at our local Radio Shack Service Center, it turned out that Fort Worth was aware of the problem and made available a "fix" for the DMP 200. The same fix did not work on my Line Printer VIII but I was informed that Tandy is modifying the parallel printer port on the Tandy 1000. To my knowledge, the modification is not yet available.

Despite this defect and one or two minor flaws, I am delighted with the Tandy 1000 and I say this having used other "compatibles."

It's nice to see PCM growing. I am also an avid reader of your sister publication, THE RAINBOW.

Phyllis M. Hartroft
Hebron, OH

COMPILING BASIC PROGRAMS

Editor:

I own a Tandy 1000 and am quite involved in writing BASIC programs. I have written numerous programs for individuals other than myself. The main problem I have is the running time of some of these programs. I use graphics in these programs, which consumes quite a bit of time.

A few months ago, I bought a book, written for the IBM PC, *Advanced BASIC and Beyond for the IBM PC*, by Larry Joel Goldstein. I realize that IBM BASIC is different from GW-BASIC, but in Chapter 11, Mr. Goldstein describes *The BASIC Compiler* and how it can save quite a bit of time on BASIC program running time.

He says there are three steps to compiling a BASIC program. First, you have to save your BASIC program in ASCII format, which I can do on the 1000. Second, you have to convert your BASIC program to object code.

This is one of the areas where I'm having problems. On the IBM, you use the PC-DOS command — BASCOM.COM to generate the object code. The third step is to use the LINK.EXE command, which is included on Tandy's MS-DOS diskette. The other problem area is the library commands. The IBM has two commands, BASCOM.LIB and BASRUN.LIB, which are the commands that finalize the third step.

1. Is there a way to compile BASIC programs on the 1000?
2. If not, why doesn't Tandy's version of MS-DOS have the commands needed to generate object code, and the .LIB commands needed to finalize the steps?

Thank you very much for your time, and let me add, I've learned more from your issues of PCM than I have from any other magazine. I think you run a class publication. Keep up the good work.

Tom R. Ferris
West Covina, CA

Editor's Note: It is possible to compile BASIC programs on the Tandy 1000, however, you must first purchase the IBM BASIC Compiler to do so. The program BASCOM.COM and the library files are not a part of IBM's PC-DOS, nor are they included with the Tandy 1000. They are, however, a part of the compiler program sold by IBM.

Even though you may compile Tandy 1000 programs with the IBM compiler, the compiler will not recognize BASIC commands that are specific to the 1000. For instance, you will not be able to use the NOISE command or the graphics modes beyond Mode 2.

COLORFUL THANKS

Editor:

I want to thank you and your staff for the finest publication I've ever encountered. You folks never cease to amaze me. I just renewed my subscription.

Since I wrote some time back regarding problems with getting the screen colors to change as you described in one issue, I thought it only appropriate to thank you and your staff again for coming through. The recent article "2000 Colors" by John Harrell is more than I expected. Then again, PCM always comes up with the best, most useful ideas and product recommendations for Tandy 2000 users.

Pat Kemp
San Antonio, TX

LINEFEED PROBLEM SOLVED

Editor:

The Tandy 1000 is a fine machine, but Tandy seems to have a little difficulty figuring out how to make it compatible with the IBM PC software.

The problem I encountered and the solution I would like to share with your readers deals with trying to print graphics on an Epson RX-80 dot-matrix printer connected to my Tandy 1000. It would print a line, skip a line, print a line and so on, which was altogether disconcerting. The software I was running was *The Technical Investor*, a fine technical stock analysis program by Savant in Houston. Savant's customer service man was very cooperative, but also couldn't solve the problem.

What caused me (and therefore my local dealer) so much anguish was the fact that the 1000 sends a linefeed signal to the printer whether it needs it or not. Some Tandy dot-matrix printers need it. IBM, Epson and some others don't.

The linefeed send by DOS can be removed by installing LPINST (or MODE LFOFF) on your MS-DOS disk and single-spaced text will be printed single-spaced when it's supposed to be, using the linefeed that's always sent out by the 1000. That's fine when printing text, but doesn't produce the desired results when you try to print graphics. When printing graphics, the DOS LFOFF command gets blocked somehow and the unwanted linefeed gets sent on through to the printer. Unsatisfactory.

Of course, the first thing everyone asked me when we talked about it was, "where are the DIP switches (in the printer) set?" The dip switches in the printer couldn't take out the extra linefeed from the 1000 for text or graphics, hence the need for LPINST (MODE LFOFF) file on the MS-DOS for the 1000 even to get single-spaced text printed correctly.

I spent many hours at home trying to figure out how to get my 1000 to print graphics and also several hours at my dealer with his Customer Service Reps trying to get it to work. They made several phone calls to the ATSO (Area Training and Service Office) in Seattle and to Ft. Worth and couldn't shed any light on the problem except to hear that when MS-DOS 2.11.22 came out, that would fix it. It didn't.

Out of desperation, I called the Epson customer service rep for this area and a man named Mark in Minnesota knew just exactly what I was talking about and what it took to fix it. That extra linefeed signal is sent out of the 1000 on Pin 14 between the computer and the printer. The solution to the extra linefeed problem is to disable Pin 14 in that cable. This can be done by cutting the proper wire in the cable, but I don't recommend that. A much easier way, and less drastic, is

to cut a narrow piece of masking tape and put it over Pin 14 at the computer end so it doesn't make contact. For some reason, when I taped Pin 14 at the printer end, the signal still got through, so I had to do it at the computer end. Obviously, I misidentified the pin number. Another reason not to cut the cable.

After you block off Pin 14 and if LPINST is installed, you now don't get any linefeed signal, so you must go back and erase LPINST so text will be printed properly.

Incidentally, I tried my original MS-DOS version 2.11 and with Pin 14 blocked, that version prints text and graphics just fine. The culprit is the extra linefeed signal on Pin 14 from the computer to the printer.

Eureka! Text and graphics are now printed out just fine.

Alva M. Hill
Bellingham, WA

LOOKING FOR DISK UTILITY

Editor:

I bought a Tandy 1000 about six months ago and I'm still amazed at the power at my finger tips. Like many others I graduated from the Radio Shack Color Computer and I'm in the process of converting some of my Color Computer programs to my handy Tandy.

What I want to know is if there is a utility program on the market for the Tandy 1000 that will permit the 1000 to read disks files from other computers. I specifically need to read IBM PC, Northstar Horizon and Sanyo 550-2. I've heard of *Xeno Copy* for the IBM PC by Vertex Systems, but what about the better machine, the Tandy 1000?

Michael H. Wilson
Martinez, CA

Editor's Note: To read IBM disks on your Tandy 1000, all you need to do is put the disk in the drive! The 1000's disk format is identical to the IBM PC's.

Since the 1000 is compatible with the IBM PC, I suspect that Xeno Copy will work on it. The only problem might be if Xeno Copy is expecting a particular disk drive controller. If the advertisements for Xeno Copy say that it will work on compatibles, it should work on your 1000 just fine.

NO SLOW TICKER

Editor:

The Tandy 1000 would be a slow computer, indeed if it had "18.2 clock ticks occur [ring] every minute" (Page 12, September 1985). The clock ticks are about eighteen per second.

Carl Oppedahl
New York, NY

1000 VERSION OF MY BASIC MENU

Editor:

I am a new subscriber to PCM. The fact that I am the proud new owner of a Tandy 1000 and that this magazine includes actual programs in its features is what attracted me to PCM.

Your October 1985 issue featured a program for the 1000, titled *My Basic Menu*. I think this program would be an excellent one to use when programming in BASIC. Unfortunately, I don't have the Tandy 1000 and don't as yet know enough about programming to answer my own questions. Thus, I am writing to you.

I would like to know if *My Basic Menu* needs to or could be modified to run on the Tandy 1000? If so, could someone tell me how to do this? I tried the program as is and part of it does work. However, Functions two through eight do not, as the files are not displayed in ascending order, nor are they numbered. They look just like they would if you used MS-DOS to display them.

I sure would like to use this program. So if you could help me I would really appreciate it.

Carole A. Kuhman
Kent, WA

Editor's Note: See John Harrell's DOS Boot column this month. He mentions how you can obtain the Tandy 1000 version of the program, on disk, directly from him.

QUESTIONS PLEASE

Editor:

I would like to express my happiness in finding out about your publication. It was unknown to me until about two months ago. After looking at several back issues belonging to a friend at work, I decided that a subscription was definitely worth having. I am glad to find a source of support for my TRS 1000. We do not have much Radio Shack support in Alaska.

I have a couple of questions that I could use help with if you can:

1) I am using a DWP-210 printer with my 1000 and would like to know who is the maker of this item. I have had no success in finding out from Radio Shack who produces this unit so I can try to locate a parts and repair facility in our area. At the present I am hoping nothing happens to the printer until I can find a qualified repair shop.

2) Also in regard to my printing needs, I purchased an Olivetti Praxis Model 35 about two years ago for my wife (she has since refused to use it and by far prefers to use the *DeskMate* Text for typing). I have read that there is a kit available for the Praxis 35 that will allow it to be modified to become a printer so it can be hooked to my 1000. I have asked the local Olivetti dealer and two computer shops where I could get this kit and have had no luck. The kit is supposed to cost about \$100 and this would be a good investment to get a \$500-

plus machine back into the running mode.

3) I recently acquired a *Home Accountant Plus* program to use with my 1000, and although it is the IBM PC version, I have found no areas of incompatibility with my 256K system. One small thing I would like to correct that has me at a loss is when I print reports on the DWP-210, I always get extra linefeeds. I have tried to make a change in the LPINST of MS-DOS and I have used the "no printer setup required" option for hardware as suggested by the makers of the software. No luck, I still get double lines on printouts.

4) Shortly after purchasing my 1000, I added the 256K expansion board and the internal 300 Baud modem board. I am beginning to see the desirability of having more memory in the near future and was wondering if there was any way of adding memory to the 256K board rather than wasting its \$250 and buying a whole new board. At the present time I do not need all the features of many of the boards I see advertised, and feel that a reworking of the existing board would be the most reasonable if it is possible.

I realize that some of these questions may have already been discussed in your past issues, but any help you can offer will be appreciated.

William L. Kirk
Chugiak, AK

Editor's Note: As best as we can tell, the DWP-210 printer is manufactured by Diablo. You will not, however, have to go to Diablo for service or parts since Tandy's service facilities are equipped to service this printer. If you are in need of parts, have your local Radio Shack order them through Tandy's National Parts warehouse. Or, you can order them directly by calling National Parts at (817) 870-5600.

There is, indeed, a kit to convert your Praxis 35 into a computer printer. A few years ago, I had this kit installed in my Praxis 35 typewriter (it cost about \$400 then) and had nothing but problems. This might be just a personal experience, but the fact is that the Praxis 35 just wasn't designed to be a computer printer. You'd be better off sticking with your DWP-210.

The MS-DOS command needed to turn off the extra linefeeds is LF OFF. Notice the space between the two words. To turn linefeeds back on, use the command LF ON. Another alternative is to modify the printer cable as discussed in the letter by Alva Hill elsewhere in this section.

The 256K board sold by Tandy cannot be modified to go beyond 256K. Tandy does, however, sell a "Memory Plus Expansion Board" that can be expanded all the way to 512K. A number of our advertisers also have expansion boards available.

PCM

Two New Stars From Texas

By Danny Humphress



he time for new products from Tandy is upon us once again. And this time, as usual, they have not disappointed us. Their new portable, the Tandy 600, was introduced in late October, and their long-awaited AT compatible, the Tandy 3000, was formally unveiled at the November Comdex show in Las Vegas, Nevada.

We were fortunate enough to get our hands on these two machines prior to release to let you know just what to expect when you run down to your local Radio Shack Computer Center to see the new gems. We were impressed and we think you'll be too.

So now, without any further fanfare, ladies and gentlemen, I give you . . .

The Tandy 3000

When IBM introduced the IBM PC AT advanced personal computer, it was only a matter of time before Tandy would follow suit and unveil a better, yet compatible, machine at a more reasonable price. For a while though, it seemed as if Tandy had forgotten about IBM's new machine. But as it turns out, Tandy was only employing a little of its Texan conservatism as it silently observed the

market. The product of this waiting and observing is the shining new Tandy 3000.

It is interesting to note that Tandy's other high-performance personal computer, the Tandy 2000, was in the hands of users months before IBM's announcement of the PC AT. Yet, the Tandy 2000 was later called an "AT clone" by one computer publication. In any event, the Tandy 3000 does fit the description of "clone," but it goes beyond being just a mirror image.

Raw Power, Raw Facts

Like the PC AT, the Tandy 3000 uses an 80286 microprocessor (an advanced version of the 80186 used in the Tandy 2000) running at 8MHz. The standard configuration comes with 512K RAM expandable to 16 Meg. MS-DOS 3.1 does not support more than 640K RAM, but Xenix 5.0, the multi-user operating system, does. However, some commercially available applications programs for the PC AT have special methods for supporting this extended memory.

There is room for three half-height drives in the Tandy 3000's cabinet. One of the drives, supplied with the computer, is a 1.2MB floppy disk drive. There



*Tandy finally unveils its AT compatible
and a new portable*



is room for one more 1.2MB or 360K floppy disk and one or two 20M or 40M hard disk drives. One version of the machine comes with a 20M hard disk built in.

It was a welcome sight to look under the hood of this machine and find so many expansion slots waiting to be filled. The machine has a total of 10. Seven of the slots accept either standard PC cards or PC AT cards. One of these slots is used for the floppy drive controller, one for the optional (but requires display adapter) and one for the hard disk controller (if you purchase a hard disk machine). Two of the 10 slots accept only standard PC cards, and the other "short" slot is occupied by the Serial/Parallel adapter, which is included with the standard machine configuration.

Like the AT, the 3000 comes with a built-in clock/calendar and CMOS RAM. The CMOS is used for storing system configuration information, such as the number and size of drives and the amount of memory. This memory replaces the DIP switches found in most machines.

It seemed for a while that Tandy had decided to standardize on the ergonomic Tandy 1000/2000 keyboard. Although it causes a bit of confusion when software manuals refer to the IBM keyboard, its design is much more comfortable than the standard PC keyboard. For example, the arrow keys are not combined with the numeric keypad as in the IBM configuration. It is a surprise, then, to see an IBM AT-like keyboard attached to the 3000.

Tandy's new 84-key keyboard directly emulates the AT's, except it doesn't have that "expensive click touch" of its IBM counterpart. Instead, it has a feel that I can only describe as "mushy." This is not a problem that would keep me from purchasing this machine, just a minor annoyance.

Choose Your DOS

I suspect most users of the new Tandy 3000 will operate the machine using MS-DOS 3.1. This affords them full software compatibility with the IBM PC AT. There is, however, an alternative. Microsoft's Xenix 5.0 multi-user, multitasking operating system is scheduled to be available for the Tandy 3000 in March 1986. The built-in RS-232 serial port and the optional four-user serial board allows the Tandy 3000 to be shared by six users (five at remote terminals and one at the computer

console). Xenix, you might recall, is the operating system currently used on the Tandy 6000.

It is important to note, though, that MS-DOS software does not run in Xenix — it must be run using MS-DOS. Although there is a good amount of Xenix-compatible software, most of it is not on the leading edge of software technology. Rather, it is of the "down

... a welcome sight ... to find so many expansion slots"

to business" variety. One interesting exception to this, however, is the special version of *DeskMate* that Tandy plans to ship with Xenix.

If you have a need to use both MS-DOS and Xenix, the Tandy 3000 allows you to partition the hard disk into two areas — one for MS-DOS and one for Xenix. However, the computer cannot currently run both operating systems simultaneously. Because there are two operating systems to choose from, neither one is included with the machine. The MS-DOS 3.1 package includes BASIC and *DeskMate* and sells

Tandy 3000 Products

25-4001	Tandy 3000 512K	2599.00
25-4010	Tandy 3000HD 512K	3599.00
25-4030*	Memory Expansion Board	499.95
25-4031*	Quad Channel Serial Board	N/A
25-4033	80287 Math Coprocessor	395.00
25-4050	1.25M Floppy Disk Drive Kit	299.95
25-4051	360K Floppy Disk Drive Kit	199.95
25-4060	Hard Disk Drive Controller	499.00
25-4061	40M Hard Disk Kit	N/A
25-4062	20M Hard Disk Kit	799.00
25-4063	External Hard Disk Cable	N/A
25-4034	Serial/Parallel Adapter	169.95
25-4101	MS-DOS 3.1, BASIC, <i>DeskMate</i>	99.95
25-3046	Deluxe Text Display Adapter	249.95
25-3047	Deluxe Graphics Display Adapter	499.95
26-5111	VM-1 Monochrome Monitor	199.95
26-5112	CM-1 Color Monitor	599.00

Package: Deluxe Graphics Adapter and CM-1 Monitor 799.00

* Available first quarter 1986

for \$99.95. The price of Xenix is, as yet, unannounced.

Oh, That Display!

When used with Tandy's color graphics adapter and CM-1 monitor, the color text characters are remarkably detailed for a color display. In addition to the standard IBM graphics modes (for compatibility), the 3000's graphics adapter provides 640 by 400 resolution of two colors and 16 colors at 640 by 200 resolution. The CM-1 is the same color monitor currently used by the Tandy 2000.

Lightning Speed

Although I did not have time to do a thorough benchmarking, I found the 3000 to be exceptionally fast — faster than the Tandy 2000. Floppy and hard disk access times seemed to be speedier than the 2000 as well as the general processing speed.

So Should I Go Out and Buy One?

Yes. If you're in need of an advanced personal computer, especially if you've been considering an IBM PC AT, and you need IBM compatibility, the 3000 is a wise choice. At a time when most AT compatibles are selling for about the same price as the original IBM PC AT, Tandy's 3000, selling for about \$1,400 less, is a welcome alternative. Combined with the support and training facilities of the world's largest computer retailer, it's a fantastic bargain!

The Tandy 600 — Tandy's Super Portable

While everyone was expecting Tandy to introduce an MS-DOS portable, Tandy was readying a machine using the same formula as the successful Model 100. What Tandy *did* introduce was a non-MS-DOS, 16-bit machine with a better display, more memory, built-in disk drive and greatly enhanced versions of the the most popular portable computer software.

Naturally, I was skeptical. Could Tandy really successfully sell such a machine? A machine without the blessings of MS-DOS? Then I asked myself why most people need battery-operated machines, and I began to understand their reasoning. After working with the 600 for a while, I became a believer.

Why do people need battery-operated machines? Do we really need to be able to run *Symphony* or *Peachtree Accounting* while we're waiting for a plane? I don't think so. Oh, that might be nice on occasion, but does it justify the cost of such machines? What the majority of people on the move *do* need is a productivity *tool* that can move with us. A machine that allows us to write, calculate, communicate, file and keep our busy schedules in order. The Model 100 and Tandy 200 filled this need for most of us. For those who need (or want) more power and versatility, we now have the Tandy 600.

Nuts and Bolts

The plain Tandy 600 comes with 32K of RAM, expandable to 128K or 224K with a 96K upgrade kit. Thank you Tandy! Unlike the Tandy 200, all of the memory is available in one bank. The built-in disk drive stores 360K on one 3½-inch diskette. This again is different from the portable drive for the 100 and 200, which stores only 100K.

Like the Tandy 200, the screen folds down over the keyboard when the computer is not in use. Unlike the 200, however, the 600's screen displays 16 lines of 80 characters. Also unlike the 200 and most other LCD screens, the display in the 600 is easily readable! In fact, the quality of the display is the single most impressive thing about this machine. After spending months searching for a comfortable viewing angle on the 200, it is a joy to use a display that was not only easy to read, but easy to read *with* an extra 40 characters per line.

The keyboard on the 600 is not much different from its two brothers in the Tandy portable family. It has 10 function keys and no LABEL and PASTE keys (these functions are handled differently). The cursor control keys, while not the full-sized keys I had become used to on the 200, are arranged in a cluster — not just four across as on the 100.

Like its predecessors, the 600 has a built-in 300 Baud modem that can be connected directly to the phone line or attached to a standard phone handset with optional acoustical cups. It is capable of both tone and pulse dialing. Additionally, when connected directly, the modem is capable of answering the phone and automatically connecting the computer.

Room For Expansion

There are three expansion ports on the back of the Tandy 600: the standard RS-232 and parallel printer connectors as well as a connector for a second floppy disk drive (not yet available) or other future expansion. Missing from the lineup of ports is one near to my heart, the BCR connector. So you'll be unable to scan the pages of PCM with this machine.

A door on the bottom of the machine reveals five ROM chips. One holds the *Multiplan* application and the other four contain the rest of the applications software that comes bundled with the machine.

The machine does not come with the BASIC programming language, but it can be purchased separately on ROM and installed in place of the *Multiplan* ROM. You need not be without *Multiplan*, though, since the application can be copied to RAM and/or disk before the chip is removed. It is also possible to copy the BASIC ROM to RAM or disk.

The Tandy 600 comes with eight volt power supply and built-in rechargeable batteries. Thanks again, Tandy! The batteries are automatically charged whenever the computer is turned off and connected to the power supply. The manual warns, however, that you should not allow the batteries to charge for more than 14 hours (enough time for a full charge), as overcharging reduces battery life. According to the manual, a fully charged Tandy 600 should oper-

ate for six to 11 hours, depending upon the amount of time spent accessing the disk drive and using the RS-232 and printer ports.

Applications Software — The Works

The ROM software bundled with the Tandy 600 is light years ahead of similar applications on Tandy's other two portables. It uses a set of applications called *Microsoft Works*. This includes the *System Manager*, a main-menu type operating system that controls all aspects of the machine's operation; *Word*, a true word processing program very similar to its namesake on desktop machines; *Calendar*, an advanced scheduling system; *File*, a database manager; *Telcom*, a full-featured communications program; and *Multiplan*, an implementation of Microsoft's popular spreadsheet product.

One of the nicest features of *Microsoft Works* is that you can call up an application while working in another. If you're writing a proposal and need to refer to your spreadsheet, no problem! I found the *Sidekick*-like pop-up calculator to be especially helpful.

The word processor (it really *is* a word processor — not just a text editor) is based on the popular *Microsoft Word* product. Unlike the big *Word*, however, it does not support proportional-space printing and mouse cursor control. It does have full text and page formatting, search and replace, and advanced editing functions, though.

The terminal program is also much more advanced than its Tandy 100/200 counterpart. One advantage is that it supports the XMODEM protocol for file transfer. Another is that it allows you to save configuration files containing communications parameters, such as Baud rate, parity and filters. There's even an elapsed session timer to help keep track of your time on information services such as Delphi and CompuServe.

The database program included in *Works* is similar to the spreadsheet-type, row-and-column database you would find in *Lotus 1-2-3*. It, however, allows you to mask data entry and format output much as you would using BASIC's USING statement. You may sort on any field or any combination of fields, and search for or print records based on a number of criterion.

Multiplan is similar to the spreadsheet program for the Tandy 100 and included in the Tandy 200. There are two big differences, though — since the

screen dimensions are larger on the 600, you can see more of your spreadsheet on the display; the 600 uses a 16-bit processor, so the recalculations are faster — much faster.

One of my favorite features is the scheduling section called *Calendar*. When you first enter *Calendar*, the current month is displayed with the current date highlighted. You can "zero in" on a day in that month or go to any other month. Selecting a day shows a list of all the scheduled events for that day as well as a prioritized "things to do" list. The Alarm feature automatically "wakes up" the computer and reminds you of appointments.

A pop-up calculator is available from within any application or from the applications manager menu. As you enter figures into the calculator, the figures and results are displayed in a "printer calculator" fashion. That is, they scroll up the screen as if they were being printed on calculator tape. Nice touch.

The evaluation machine we reviewed did not include BASIC, so we were unable to look at it thoroughly. I did, however, have the opportunity to work

with a Tandy 600 with the BASIC ROM when recently in Ft. Worth visiting Tandy's corporate offices. From what I found, it is very similar to GW-BASIC, the language found on most desk-top PCs. Hopefully, we'll be able to bring you more details on the programming language in the near future.

So What's Perfect?

As much as I liked the Tandy 600, I did have a few *minor* complaints.

One of these problems became evident when I attempted to pick up the machine. No, it's not the weight — the machine weighs about nine pounds. The problem is that the only way to move the machine is to tote it under your arm or put in in an attache or other carrying case — there's no handle. It wouldn't have added much expense to attach a little plastic handle on the front or back of the machine.

When I found myself lost in the *Telcom* application, I searched all over the machine for a Reset button. I never found one! I don't know how much of a problem this will be, but I sure grew accustomed to reaching around the back of my Tandy 200 on such occa-

sions. The next alternative was to turn the machine off and on again. But, as it turns out, the darned thing is so smart it remembered what I was doing when I turned it off and took me right back to the same place.

I personally would have liked to have seen BASIC included in ROM on disk, but I am speaking as a programmer, of course. As mentioned earlier, most portable owners use their machines for one of the built-in applications and don't plan to do any programming, but there will surely be a lot of disappointed hackers out there!

The Bottom Line

In conclusion, I'm quite impressed with this new machine. I do wonder, nevertheless, if the suggested retail price of \$1,595 is going to scare many people away. When you consider what it costs to take a lesser portable such as the Tandy 200 and upgrade it to as near the power of the 600 as possible, you'll spend about as much money as the price of a Tandy 600. For those who need a powerful portable — not a substitute for a desk-top machine — the Tandy 600 is perfect. **PCM**

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Secondly, LUCID[®] is fast. LUCID[®] is so rapid, a 36 column corporate financial statement took less than 4 seconds to calculate.

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Further, LUCID[®] has what no other spreadsheet has: Cut, Copy, and Paste. It uses the same keys as Cut and Paste in TEXT, but here's the difference: it takes all the formulas with it when you paste and they all automatically recalculate with the entire sheet.

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Increase spreadsheet versatility with these built-in functions

Spreading on More Spreadsheet Functions

By Richard A. White
PCM Contributing Editor

There are occasions when a spreadsheet is required to choose a value based on some other value. *Lotus 1-2-3* provides @CHOOSE(), @VLOOKUP() and @HLOOKUP() to do what the names sound like they do. Other spreadsheets provide versions of these plus variations and extensions like @INDEX(). Surprisingly, *Lotus* is somewhat limited in this area compared to some other spreadsheets. On the other hand, *Lotus* has some unique data management subcommands under /Data Query that can handle some jobs you would use @INDEX() for if it were available.

Let's first address the question of why you would want one of these functions. Correctly calculating a sales tax comes immediately to mind. Most, if not all, sales taxes set up breakpoints to standardize when the next penny is charged. Say a state has a 5 percent sales tax. The law might prescribe that two cents will be charged between \$.21 and \$.40. Now, if you have set up an invoice or sales slip form in your spreadsheet, you will certainly want the computer to calculate the sales tax. Why use the computer at all if you have to look things up in a table and type them in.

Another use is to look up data to calculate income taxes. I did a spreadsheet that uses the IRS schedules to calculate your tax. I could have done the spreadsheet so that the user had to look up the tax in the tables and enter it into the spreadsheet. The spreadsheet procedure returns exactly the tax shown in the tables without error. That's more than we can regularly expect from people. Other uses include selecting quantity discount rates, selecting commission rates and the like. You could even devise a spreadsheet that enters an item's price automatically based on a stock number and order quantity.

The first function to discuss is @CHOOSE(Key, Arg1, Arg2, ..., ArgN). Key must be an integer number from one to N, or be a cell reference that contains such a number. Arg1 means argument one, which may be a number, formula or another function. The term argument means some acceptable entry. What it is depends on the procedure or function being used.

(Richard White has a long background with microcomputers and specializes in BASIC programming. He has authored numerous programs and articles. His work has appeared in PCM's sister publication, THE RAINBOW.)



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As an example, Wigits Inc. has set up a year-end bonus system based on years with the company. It starts at 5 percent and tops out at 15 percent for employees with more than 10 years with the company. A spreadsheet to calculate the bonus is shown in Figure 1.

Figure 1. Employee Bonus Spreadsheet.

[A]	[B]	[C]	[D]
1-			
2-EMPLOYEE	SALARY	YEARS	BONUS
3-			
4-Adams	20000	1	1000.00
5-			
6-Jones	40000	5	4000.00
7-			
8-Smith	60000	15	9000.00

The formula in cell D4 looks like this:

```
B4*(.05+@CHOOSE(C4,0,.01,.02, . . . ,.1,.1,
. . . ))
```

Note that I did not include .03, .04, etc. and extra .1s, which would have to be included in a real function call. @CHOOSE() gets the key (in this case, the value from the C column cell) and counts through the list of data values.

In Adams' case, @CHOOSE() looks no further than the first data item. To deal with Smith there need to be at least 15 data items. The @CHOOSE() function might get a bit long if the company had been in business for a while. So there are limits in using @CHOOSE() in this way.

The ability to include formulas and functions as arguments may be attractive if these are not too long and their number is limited.

Some spreadsheets, but not *VisiCalc* or *Lotus*, let one use cells and cell ranges for arguments. When this is possible, @CHOOSE() becomes much more powerful since the limit on the number of characters in a cell formula can be avoided. It now looks more like the powerful multiple choice statements like CASE in PASCAL and C or even ON X GOSUB from BASIC. To use these, the programmer must in some way choose integers to identify the choice desired just as with @CHOOSE().

Figure 2. Employee Bonus Spreadsheet with Lookup Table.

[A]	[B]	[C]	[D]
1-			
2-EMPLOYEE	SALARY	YEARS	BONUS
3-			
4-Adams	20000	1	1000.00
5-			
6-Jones	40000	5	4000.00
7-			
8-Smith	60000	15	9000.00
9-			
10-	1	0	
11-	2	.01	
12-	3	.02	
13-	4	.03	
14-	5	.04	
15-	6	.05	
16-	7	.06	
17-	8	.07	
18-	9	.08	
19-	10	.09	
20-	11	.1	
21-	100	0	

Figure 2 shows our familiar bonus spreadsheet with a lookup table added. The column D cell formulas become

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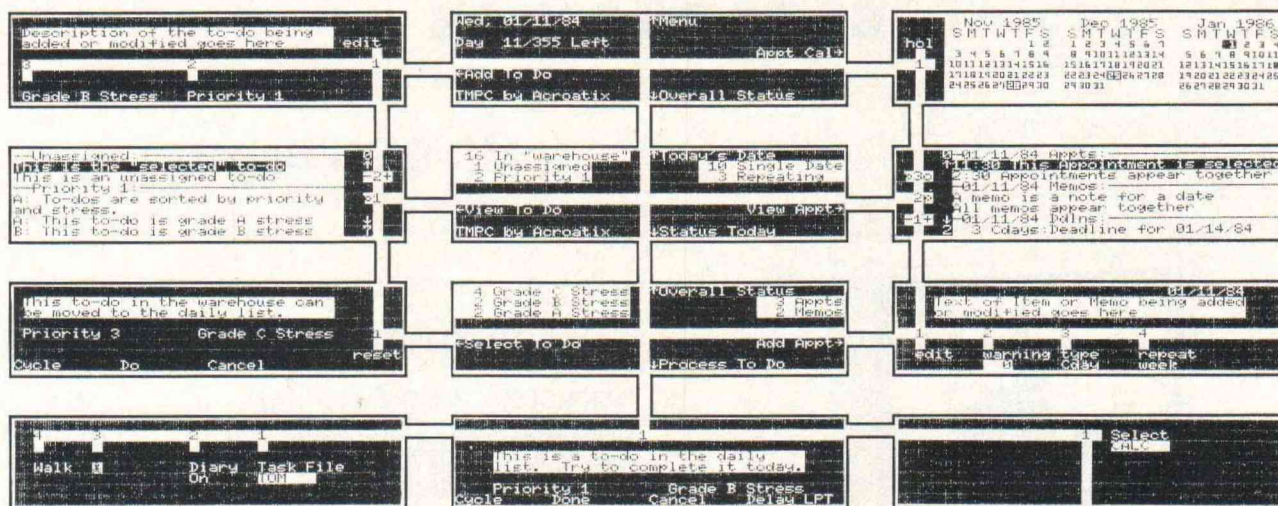
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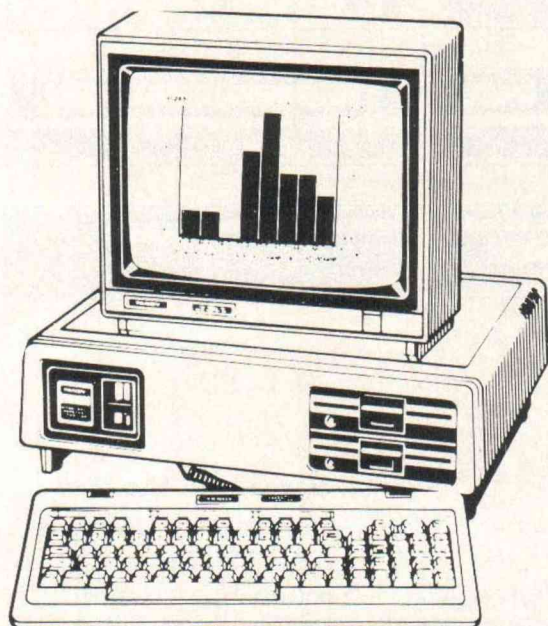
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a little simpler when we use @VLOOKUP() to get the right value from the table. Here's what a typical formula looks like:

+B4*(.05+@VLOOKUP(C4,A10 . . . A21,1))

The form of the @VLOOKUP() function in *Lotus* is @VLOOKUP(Key,Cell Range,Offset). The key may be a number or cell reference and is sometimes termed the test variable. The Cell Range refers to at least two partial columns. The first coordinate, A10 in our case, is the top of the comparison column. The second coordinate, A21, defines the bottom of that column. If you have named that range in *Lotus*, you may use the range name instead of cell references.

Lotus allows for more than one column of data to be associated with a comparison column. Therefore, you have to indentify the offset to the column you want to use. In

our case, we have only one column so the offset is 1. The offset must be a positive number and not exceed the number of columns in the table. The offset to the comparison column is 0, which implies that it can be its own data column. This works with the tax-lookup table below and results in a smaller lookup table.

You need to be very clear on how a LOOKUP() function works since it *does not* simply find the number in the key and get the value in the data column or row. Rather, the comparison row or column is searched for the *largest value that is not greater than* the key. The associated data value is returned. Now the 100 in cell A21 of Figure 2 serves to force any value greater than 11 to return the .1 value associated with 11. In the bonus spreadsheet this means that all people with 11 or more years with the company get a 15 percent-of-salary bonus. In this case, 100 is large enough since no one works for 100 years.

That all-time favorite, the federal income tax, provides an excellent opportunity to use LOOKUP(). In fact, LOOKUP() was designed to handle tax calculations.

The lookup table in Figure 3 provides all the data that is needed for calculating federal income tax for married couples filing jointly. Programming a spreadsheet to use that data is another matter. We will start with the fact that if your taxable income is less than \$50,000, you must use the tax tables and report the amount from there rather than the amount computed from the tax schedules. It turns out that the tax tables are laid out in \$50 increments and that the tax shown is for the middle of that range. If your taxable income is \$28,010, you will pay tax on \$28,025. So the first task is to work over the taxable income so it will return a tax table tax.

Figure 3. Lookup Table for Schedule Y of the 1984 Federal Income Tax.

	[A]	[B]	[C]	[D]
1-	1984 FED. TAX	SCHEDULE Y		
2-	Taxable Inc.	Rate	Precalc	
3-	0	0	0	
4-	3400	.11	0	
5-	5500	.12	231	
6-	7600	.14	483	
7-	11900	.16	1085	
8-	16000	.18	1741	
9-	20200	.22	2497	
10-	24600	.25	3465	
11-	29900	.28	4790	
12-	35200	.33	6274	
13-	45800	.38	9772	
14-	60000	.42	15168	
15-	85600	.45	25920	
16-	109400	.49	36630	
17-	162400	.50	62600	
18-	100000000			

[E]

1-	28010	This is Taxable Income
2-	28000	+100*@INT(E1/100)
3-	10	+E1-E2
4-	25	@IF(E3<50,25,75)
5-	28025	+E2+E4
6-	28025	@IF(E1<50000,E5,E1)

Cell E1 contains the taxable income. In E2 the integer function @INT() is used to strip off whatever is less than an even hundred dollars, which is put in E3 by subtracting E2 from E1. The IF() statement in E4 checks if this is less than 50, in which case it substitutes 25. If it is 50 or larger, 75 will be returned. In E5, is the taxable income that will calculate a tax table value. However, if taxable income is

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equal to or greater than \$50,000, the calculation is performed on the unadjusted taxable income. The choice is performed by the IF () statement in E6.

Why go through all the above? Well, if you do write an income tax spreadsheet, I want you to know about the tax table problem so you get it right. Secondly, it illustrates the fact that you may need to do some pre-processing before using a LOOKUP () function. Thirdly, it is another example of a spreadsheet calculation that may give you an idea on how to solve one of your spreadsheeting problems.

[E]		
7-	3465	@VLOOKUP(E6,A3 . . . A18,2)
8-	24600	@VLOOKUP(E6,A3 . . . A18,0)
9-	.25	@VLOOKUP(E6,A3 . . . A18,1)
10-	4321	@ROUND(+E7+((E6-E8)*E9),0)

In cell E7, @VLOOKUP () is used to find the precalculated tax on \$24,600. The taxable income in E6 is less than \$29,900 in A11 of the lookup table so all lookups will be done in row 10. The '2' as the offset of the @VLOOKUP () function says use the second column to the right of the comparison column, A, when getting a value. Next, we need to get the \$24,600 so we can find the amount of income that is greater than this number. This is done in E8. The '0' for the offset tells the spreadsheet to use the value from the comparison column, A. Next, the tax rate on the incremental income over \$24,600 is put in E9. Total income tax is calculated and rounded to even dollars in E10.

The Lotus form for @ROUND () is @ROUND(X,number of digits). The X is the number to be rounded. The number

of digits may range from -15 to 15. A positive number specifies the number of digits to the right of the decimal point. A negative number rounds to the left of the decimal point.

@ROUND(123.456,2) = 123.46
 @ROUND(123.456,0) = 123
 @ROUND(123.456,-2) = 100

If the tax table had been arranged in rows, @HLOOKUP () would have been used and the offset would refer to rows below the comparison row.

The original VisiCalc version of @LOOKUP () is not as powerful since it does not provide for the offset. It assumes that the value to be returned is either in the column to the right or the row below the comparison. It is able to determine if the table is vertical or horizontal from the way the comparison range is designated and does not use the V or H designator as in Lotus.

Finally, there is another data management function that is not in either VisiCalc or Lotus which you may run across in some other spreadsheet. It is @INDEX () which looks for an exact match with a value in the comparison column or row. This is quite useful for returning a price, given a stock number. Having a number of offset columns or rows provides the ability to choose a price based on quantity ordered. If the stock number is not included in the lookup table, @INDEX () returns NA for not available. Note that @LOOKUP () is not a good function for this purpose since it is not looking for an exact match and can return a value for a number not in the table. **PCM**

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A black and white photograph of a Radio Shack Model 100 portable computer. The device is a light-colored, rectangular unit with a built-in keyboard and a small monochrome screen at the top. The screen displays some text, including "TEXT" and "TELCO". To the right of the screen is a small label that reads "Radio Shack", "TRS-100", and "MODEL 100 PORTABLE COMPUTER". The keyboard is full-sized with various function keys at the top. To the right of the computer, two Christmas ornaments, one red and one blue, are visible. The background is dark with some blurred lights.

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*The hows and whys of creating a bootable
DeskMate disk*

To Boot or Not to Boot!

By Bobby Ballard

One of the really nice things about having an MS-DOS computer is getting it to automatically boot the program you wish to use when you turn on the power and insert your program disk. And of course, you can do the same with *DeskMate*. This month I want to take you through the process of setting up your *DeskMate* disk to automatically boot and we'll learn a little about the *DeskMate* system as we go. However, there are trade offs to consider before you actually set up your diskette to automatically boot *DeskMate*.

If you haven't set up *DeskMate* to auto-boot, read on. I'll try to explain it simply and cover some of the conditions when you may not want to have *DeskMate* auto-boot.

When you first boot up your backup copy of the original *DeskMate* disk, you find files that have been created for the tutorial. These are documents, worksheets, files and electronic mail. These files don't need to be kept around after you've been through the tutorial. You should delete them using the F9 key from the main menu of *DeskMate*. Or, you can delete them from MS-DOS using the ERASE command.

If you have a one-disk computer system, it is even more important for you to free up diskette space. Even after you've deleted the tutorial files, you are

still left with limited diskette space — especially on a Tandy 1000. One way to make more room for one-drive systems is to delete the help files. Of course, if you use the help function often, you will not want to do this. If you think you can do without the help files, exit to MS-DOS and enter ERASE *.HLP. This will free up 21,659 bytes of space (Tandy 1000).

Regardless of whether you choose to delete the help files, it would still be nice to auto-boot *DeskMate*. To do this you must have room on the disk for MS-DOS. Two-drive systems work better with the "Swap" function F10 for keeping files on a separate disk and you need not be concerned with diskette space.

The first thing we'll do is pull a directory of the original disk. This way we can get an idea of which files can be deleted and which ones must remain. In addition, we'll get an idea of what the file name extensions mean.

If you take a look at Figure 1, you will see the directory of Tandy 1000 *DeskMate* as you would find it after going through part or all of the tutorial. Let's look at each of the extensions and what they mean.

The most obvious and predominant is .EXE which represents executable files. The files ending in .EXE are the actual programs that are run while *DeskMate* is at work in your computer. You must have these files all on the same diskette and they must remain in the same drive from which you booted *DeskMate*. If you delete one of these files, your system will run crazy and you'll get error messages when you make a call on that particular function.

The titles indicate exactly which

function these executable files handle. For example, TWTEXT.EXE is the section of the program that executes when you select word processing.

The next most obvious extension found in Figure 1 is .HLP and represents the text files that are placed on the screen when you press F1 for help from any of the different sections of *DeskMate*. As I mentioned above, you may delete these files to make more room on your diskette as long as you don't need access to the help files. If you delete these files and accidentally hit the help key (F1), you will get an error message telling you there is a problem with the help file. Just strike the F12 key and you will be back to where you were.

Files created by the Text section are given the extension .DOC for document. These files are erasable from MS-DOS or from within *DeskMate*. If you wish to delete all of the *DeskMate* documents from the MS-DOS command level, type ERASE *.DOC.

Files created by the Worksheet section are given the extension .WKS and will vary in length depending on the size of the worksheet you create. If you like, you may also delete these files to free extra disk space.

The Filer section appends an .FIL extension to the names you enter when creating the database. In Figure 1, you see several files with the extension .FIL. If you don't need these files, you may delete them as well. These files carry the data that you type into the database as well as the database design.

When you went through the tutorial, the manual explained how to determine the size of the different fields and the data types you would be storing. This

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information is stored in the file with your data and given one file name.

Two files in the list possess the same extension but perform entirely different functions. They are PHONE.TWS and TWSAVE.TWS.

The first file is the phone directory found by pressing ALT and F5 together. You may delete both of these files if you wish. The phone directory will recreate itself when you select ALT-F5 and put data into the file.

TWSAVE.TWS will recreate itself when you exit *DeskMate*. If you look at your original *DeskMate* diskette, you will notice it does not have a TWSAVE.TWS file on it. This file contains your system information. It is where *DeskMate* keeps track of your printer settings, telecommunications settings and even the screen colors you select. If this file is not on the system diskette, *DeskMate* loads in with the default parameters. This file is small and doesn't really add to the space problem on your system diskette. I suggest that you leave it intact.

If you create a Calendar, the file is given the extension .CAL following the file name you selected. You may have different calendars under different names, but each one will have the extension of .CAL for calendar.

The Mail section holds those messages left in the Host mode of *DeskMate*. These files have the extension .MSG which stands for message. Of course, you will want to delete these when you are done with the tutorial. Files in the Mail section are automatically given the extension .MSG.

One final file extension remains in Figure 1 that we haven't discussed. The Alarm file has the extension .ARM and, if deleted, will recreate itself as soon as you add an entry to the Alarm file. If you never plan to use the Alarm section, you will save a few bytes of disk space by deleting this file. Of course you can open a new alarm file if you change your mind. To do this, simply merge an event from the calendar file into the alarm file from within the Calendar section of *DeskMate*.

The above should give you an idea of which files do what and which files you can safely delete and which ones must remain intact. It's up to you as to which sections and files you will be using and how you will be using *DeskMate*.

The Construction

If you have only one disk drive, then making a bootable copy of *DeskMate* will require a lot of disk space and may

Figure 1

Volume in drive A has no label
Directory of A:\

DESK	EXE	26065	12-23-84	3:14p
BUDGET	WKS	2011	9-29-85	6:01p
TWTELCOM	EXE	25275	12-19-84	1:52p
TWHOST	EXE	8050	12-31-84	4:58p
TWMENU	EXE	13824	12-31-84	9:35a
TWORK	EXE	39424	12-21-84	1:20a
TWTEXT	EXE	13312	12-26-84	1:19p
TWMAIL	EXE	22528	11-01-84	12:29a
TWFILER	EXE	51278	12-17-84	2:13p
TWALARM	EXE	36893	12-14-84	1:18p
TWCALEND	EXE	42013	12-14-84	10:25a
TWORK	HLP	9431	12-22-84	9:33a
TWMAIL	HLP	824	8-21-84	1:34a
TWTEXT	HLP	1326	12-11-84	11:15a
TWTELCOM	HLP	3073	10-02-84	10:40a
TWCALEND	HLP	1834	8-21-84	1:23p
TWALARM	HLP	679	7-20-84	1:09p
TWFILER	HLP	2874	9-27-84	4:51p
TWMENU	HLP	1618	12-06-84	10:55a
ALARM	ARM	3610	8-11-85	10:00p
CLIENTS	FIL	2614	9-29-85	6:03p
ADDRESS	DOC	513	2-25-85	11:20a
AGENDA	CAL	2228	10-05-85	2:44p
MESSAGES	MSG	1518	2-24-85	2:47p
LAURA	MSG	417	2-24-85	5:33p
LHEAD	DOC	65	8-11-85	9:54p
PHONE	TWS	3156	2-25-85	11:04a
README	DOC	2137	10-05-85	2:46p
LETTER	DOC	657	2-25-85	10:33a
WILLIAMS	DOC	62	2-25-85	12:33p
TWSAVE	TWS	929	10-05-85	2:49p
SUPPLIER	FIL	1566	9-29-85	6:06p
EXAMPLE	WKS	2031	2-25-85	10:58a
		33 File(s)	21504 bytes free	

not be worth it. That's the reason for the title of this column. To make a bootable copy of *DeskMate* and still have room left for files will require that you delete the help files and as much of the tutorial files as possible. Of course the convenience may well be worth it for a quickly

bootable copy to telecommunicate with though. You will have to make that decision.

To quickly delete all the help files on your *DeskMate* diskette, place it in Drive A and type ERASE *.HLP and ENTER and then do the same using the

Figure 2

A>chkdsk b:

362496 bytes total disk space
23552 bytes in 2 hidden files
16384 bytes in 1 user files
322560 bytes available on disk

638976 bytes total memory
598160 bytes free

extensions of other files you wish to delete.

In order to have room for the files needed to automatically boot *DeskMate* you will need about 40,000 free bytes. This space is used by the MS-DOS files required for booting the system. This is a minimum and you may need a few extra bytes if you are going to create a CONFIG.SYS file and you must have a few bytes free for an AUTOEXEC.BAT file.

To get started, place your MS-DOS diskette in the Drive A and type FORMAT A: /S which will create a formatted blank diskette ready for your *DeskMate* files. Actually the disk is not blank when you use the /S parameter. This causes the new diskette to be set up with the necessary files for MS-DOS to use when booting. The files added to your new diskette are COMMAND.COM and two hidden files that will not show up when you issue a DIR command. These two files use 39,936 bytes on a Tandy 1000.

To see what I mean, insert your system diskette and type CHKDSK B: and press ENTER. The computer will prompt you for the diskette for Drive B. At this point switch diskettes, replacing your system disk with the newly-formatted disk. You should get a report on your screen that looks like Figure 2. As you can see, there are two hidden files that take up about 24K and one user file that takes a little over 16K. This is the 40K I mentioned earlier.

The next step is to copy any .COM files necessary for your system to operate from your MS-DOS disk to the new disk. If you have a CONFIG.SYS file that sets up your system for certain hardware and file sizes then copy this file to your new disk also.

The next to last step is to copy all of the *DeskMate* files you wish to use to your new disk. Use the COPY command and make sure you copy all of the executable files that end with .EXE

along with the rest of the files you wish to use. For one-drive systems, issue the command COPY *.EXE B: and follow the prompts. Then enter COPY *.TWS B: to preserve your *DeskMate* system configuration. If any of the other files are important to you, do the same using either the complete file name or the wildcard (*.*) followed by the appropriate extension.

The last step is to create an AUTOEXEC.BAT file that will cause *DeskMate* to automatically load up on power-up or reset. To create this file, type COPY CON: AUTOEXEC.BAT and press ENTER. Now type DESK and press ENTER followed by CTRL-Z and press ENTER again. This file takes up only a few bytes of disk space. You may wish to add other commands to this file before typing CTRL-Z and ENTER depending upon your system configuration.

You now have a bootable copy of *DeskMate* that will automatically load up on power-up or when you press reset. One tip here; you may create a reset condition by holding down the CTRL, ALT and DELETE keys at the same time. This is the same as pressing the reset button on the Tandy 1000 or 2000 and takes you to the "memory size" message followed by the BIOS prompts. This tip is generally true for most MS-DOS computers.

Making a bootable copy of *DeskMate* is well worth it for a two-drive system and I highly recommend it. It is essentially the same as the above instructions only with less disk swapping.

Let's Swap

Speaking of swapping, I have one final word for this month for two-drive users of *DeskMate*. Make the bootable version of *DeskMate* as I've explained this month and keep your files on another disk in Drive B. This will give you lots of room for different files and you can create different diskettes for

different applications. For example, you could have a disk labeled "Office" and one labeled "Home" and keep different files on each. This way, when you use the swap command, you can switch between your office and home files quickly and easily.

The Swap function is easy to use and not really fully explained in the manuals you receive. If you boot up your *DeskMate* system using Drive A, you can use Drive B to load and save your files.

To make the switch, just tap the F10 key from the main menu of *DeskMate*. You will then see a prompt at the bottom of the screen with the current drive and directory displayed. To change to Drive B just type B: and the directory you wish to use or just B: and ENTER. This will cause *DeskMate* to search Drive B for all the files with extensions that *DeskMate* recognizes. So any files ending in .DOC will appear under Text, .FIL under Filer and so on.

One final tip; you can also create different directories instead of different diskettes for files like "Home" and "Office." Then you can swap between directories using the Swap command (F10) without even swapping diskettes in Drive B. You will need to use the MS-DOS command for making directories (MKDIR) and do your directory building from the command level of MS-DOS.

We've covered a lot of ground this month, learned a little about making *DeskMate* easier to use, made a bootable copy of *DeskMate*, gained some insight to the way *DeskMate* is set up and how to handle the different files on the original disk. I hope you will experiment with this information and try different approaches to *DeskMate*. If you have any problems or questions, don't hesitate to write to me. I'll give it my best shot. Also, send in any suggestions or tips you have on using *DeskMate* and I'll share them with everyone.

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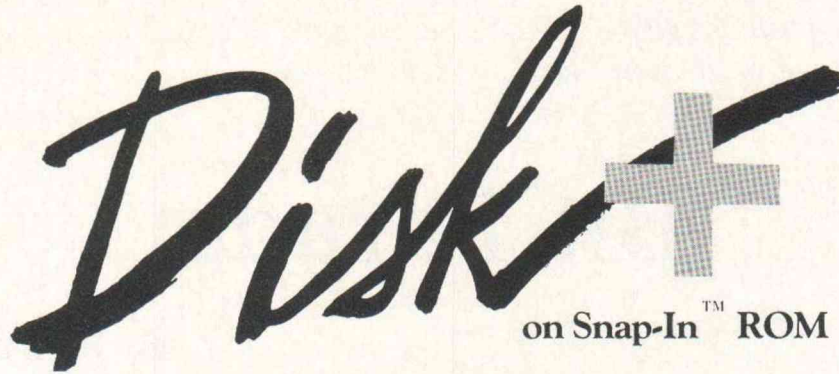
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You connect your Model 100 to your other computer using an RS232 cable (available from PCSG for \$40).

You just place the *Disk+* diskette into the desktop's drive and turn on the computer. It powers up automatically and says "awaiting command" on your desktop's screen. Then you just put the widebar cursor on the Model 100 main menu on *Disk+* and press ENTER. You are shown your RAM files arranged just like the main menu.

To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

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Compose melodies on your portable and integrate them into your BASIC programs. You'll have your own "Hit Parade" with . . .

Bit Parade

By Richard Ramella

If you can pick out a simple tune on a piano with one finger, you can use the Model 100 8K BASIC program *Bit Parade* to record and play back melodies. The program listing also contains a demonstration of how to integrate your played-by-ear songs into other BASIC programs.

In the record mode, *Bit Parade* stores what you play as notes and the duration they are played. In the play mode it plays back the recording at any of eight speeds and in any of five octaves you select.

First, type and save the listing on tape or disk.

On first running the program you will be playing a melody that is saved in a text file for later retrieval and playback. The first event is the prompt `<R>ecord` or `<P>lay?` Press key R and press ENTER. A second prompt asks "File-name?" This is the name of the melody and must be answered by typing one to six characters and pressing ENTER. Then comes the instruction Play to record a tune now. and a buzzing noise.

The computer keyboard characters `ASDFGHJKL:` are the notes GABC DEFGABC, the white keys, with F representing middle C on a piano. In the keyboard row above this row, keys `WETYIOP` are the sharps and flats, the black keys. If you can't find a note in the `ASDF . . .` row, feel it out on the row above. Playing by ear, experimentation, is an important way to learn the keyboard.

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 computer programs.)

As you play the first note, its tone continues until you play another note. This can have the mental effect of slowing or freezing your keyboarding. It's important to remember the keyboard actually has a quite fast response if you wish to play quickly. Also, remember that in playback you can speed up the melody; so the important thing in playing is tempo — timing — not speed. The continuing tone of the most recently played note is meant to instill a sense of tempo in your effort, but if it bothers you, delete the characters `SOUND Z,1:` from Line 260 of the listing and change Line 310 to `310 SOUND (Q+P),5:PRINT#1,N$.`

Because the program is storing the note and its duration as two characters in the text file, opened as you named it, you may continue playing until computer memory is filled. However, it's unlikely you can play an entire Wagnerian opera's score without a miscue. Since the file is opened for appending material, it's best to key in short passages of the melody until you get each right, then restart the program to add to it. If you make a mistake, stop the program, kill the text file and start over.

To end a recording session, press the enter key.

It is possible to edit the music. It is stored in the text file as a series of letters, representing notes, and numbers, representing duration of a note. Concerning duration, the number one is short, the number eight is long. You will have to become familiar with the keyboard to substitute the right note through editing the text file.

Now for playback. Run the program again. Answer the prompt `<R>ecord` or `<P>lay?` by pressing P, then ENTER. Answer the prompt `Filename?` with

the name of a file in which you have already stored a recording and press ENTER.

This prompt then appears: `Octave 1 to 5?` The number one is low, five is high. Type a number from one to five and enter.

Another prompt appears: `TEMPO: Slow<87654321>FAST?` Number eight is very slow, number one is quite fast, and the other numbers range in speed between these two extremes. Type a number and ENTER.

The final prompt in this section is `Press a key to begin.` Tap a key and you will hear the stored melody played back.

If the playback lacks the verve you'd hope for, try again, varying octave range and tempo to improve it.

The final step is to learn how to put recorded melodies into your own BASIC programs. That's the reason I wrote this program in the first place — to avoid constant trips to the piano, returning with an imprecise memory of what I'd just played.

Before you learn this, you should know that musical text files of only 255 or fewer characters may be conveniently put in a program. The reason? A BASIC string variable has a ceiling of 255 characters.

Delete the characters `REM` from Line 175. This causes the program to effectively be comprised of lines 100-170, which you will need in any program playing the music you've created, and of lines 470-560, which play the music you've stored.

Run the program and you will hear the first few notes of an old song about a girl named Mary, whose pet was a lamb. When you've experienced that thrilling melody, change Line 470 to `470 Q$=""` and continue with the fol-

lowing experiment.

Think of lines 470 through 490 as variable setters, and consider lines 500 through 550 as a subroutine that plays the music according to the variables you've set. It will all be explained.

In learning how to use this method in your own program, the first step is to record a melody. Let's say you've put your song in a text file named VERDI.

If the following instructions seem forboding, just do them one at a time and be assured each will work.

Run *Bit Parade* and break into the program without doing anything else. Type SAVE "BIT.DO" and press ENTER. Now kill the *Bit Parade* BASIC program. Go into the VERDI text file. You will now save the melody in the text buffer. Position the cursor over the first character in the file. Press function key 7 (F7). Press the right-arrow key to move the cursor to the final number in the file. Do not include the characters ^M^M at the end of the file. Press function key 6 (F6) to store the material in the paste

buffer. Then press function key 8 (F8) to exit the file.

You will find yourself in menu mode. Move the dark cursor over the filename BIT.DO. Press ENTER to get into the file. Go to Line 470. Position the cursor over the second quote mark in the characters Q\$="". Then press the PASTE key, which is to the right of the F7 key. The melody string is put where it's supposed to be, as the string value of Q\$. Now press function key 8.

In menu mode, with the dark cursor over the word BASIC, press ENTER. Type RUN "BIT.DO" and ENTER. You will hear the melody you transferred from the text file. It now exists as a string value within a BASIC program.

In putting music into your programs, consider the necessities:

- Line 470 holds the string value of the recorded melody.
- Line 480 begins with an assignment of numeric variable R to any value from one to five.
- Line 490 sets the tempo. Numeric

variable T can equal any whole number from eight to one with eight representing the slow value.

In a practical program, more than one melody can be played by setting the three variables stated above, then going to an unchanging subroutine whose events are contained in the demonstration within lines 500-550. To achieve this, you would need a GOSUB line following Line 490 and a RETURN line following Line 550.

Finally, I have written a melody-guessing game using the ideas explained in this article. It has 50 musical excerpts for play. Cover my costs by sending \$2.50 and I'll mail you a cassette containing the game and the text file of melodies. My costs include the cassette, postage, packaging, copying the instructions and payment to the elf who does the work. When you write, include your name and mailing address. Send requests to Richard Ramella, ATTN: BIT, 1493 Mt. View Ave., Chico, CA 95926. □

The listing:

```
100 REM * Bit Parade / Model 100 8K / R
ichard Ramella
110 DATA 12538,11836,11172,10544,9952,93
94,8866,8368,7900,7456,7032,6642
120 DATA 6269,5918,5586,5272,4976,4697,4
433,4184,3950,3728,3516,3321
130 DATA 3134,2959,2793,2636,2484,2348,2
216,2092,1975,1864,1758,1660
140 DATA 1567,1479,1396,1318,1244,1174,1
108,1046,987,932,879,830
150 DATA 783,739,698,659,622,587,554,523
,493,466,439,415
160 CLEAR 200: CLS: DIM A(60): FOR X=1 T
O 60: READ A(X): NEXT: DEFSTR K,B,M
170 K="awsedftgyhjikolp;": P=24
175 REM GOTO 470
180 INPUT "<R>ecord or <P>lay": X$
190 IF INSTR("RrPp",X$)=0 THEN CLS: GOTO
180
200 IF X$="P" OR X$="p" THEN CLS: GOTO 3
50
210 CLS: INPUT "File name": X$
220 OPEN X$+".DO" FOR APPEND AS 1
230 CLS: PRINT "Play to record a tune no
w"
240 B=INKEY$: IF B<>" " THEN J=J+1
250 IF J>0 THEN N=N+1
260 SOUND Z,1: IF B=CHR$(13) THEN GOSUB
330: PRINT #1,MID$(STR$(N),2)+B+B: CLOSE
1: END ELSE IF B="" THEN 240
270 Q=INSTR(K,B): IF Q=0 THEN 240
280 Z=A(Q+P): IF J=1 THEN PRINT#1,B;: GO
```

```
TO 240
290 GOSUB 330
300 N$=MID$(STR$(N),2)+B: N=0
310 SOUND A(Q+P),1: PRINT#1,N$;
320 GOTO 240
330 N=INT(N): IF N<1 THEN N=1 ELSE IF N>
8 THEN N=8
340 RETURN
350 INPUT "File name": X$
360 OPEN X$+".DO" FOR INPUT AS 1
370 INPUT "Octave 1 to 5": R: IF R<1 OR R
>5 THEN CLS: GOTO 370 ELSE R=INT(R)*8
380 INPUT "Tempo: SLOW < 8 7 6 5 4 3 2 1
> FAST": T: IF T<1 OR T>8 THEN CLS: GOTO
380
390 PRINT "Press a key to begin."
400 V$=INKEY$: IF V$="" THEN 400
410 N$=INPUT$(2,1): IF EOF(1) THEN END
420 P$=LEFT$(N$,1): Q=VAL(RIGHT$(N$,1))
430 P=INSTR(K,P$)
440 SOUND A(P+R),Q*T/2
450 FOR TW=0 TO T: NEXT: GOTO 410
460 REM * Program demo begins *
470 Q$="h8g6f6g6h7h6h8g7g6g8h8k6k8"
480 R=3: R=R*8: REM * R=octave 1 to 5
490 T=2: REM * T=tempo SLOW < 8 7 6 5 4
3 2 1 > FAST": T
500 FOR Y=1 TO LEN(Q$)-1 STEP 2.
510 N$=MID$(Q$,Y,2)
520 P$=LEFT$(N$,1): Q=VAL(RIGHT$(N$,1))
530 P=INSTR(K,P$)
540 SOUND A(P+R),Q*T/2
550 FOR TW=0 TO T: NEXT TW,Y
560 REM * end of listing
```

PCM

The creative use of your portable's function keys makes this file management utility a highly efficient tool

'Easy Keys'

By Linwood McDowell

The Model 100 has eight dynamic little jewels commonly referred to as function or "soft" keys, which, when exploited, can make any program easy to operate. *KEYS* is a remarkably efficient document-file management tool, whose strong suit is the creative use of these soft keys to integrate its various features for results that are practical and exciting.

Getting Started

Because the listing for this utility is relatively long and somewhat intricate, in the interest of brevity, I will not attempt to provide a line-by-line analysis per se. Instead, I will identify the inclusive program lines that control each routine as I explain its operation. Occasionally, I may depart from this course and comment directly on a particular routine, but only as a point of interest or of necessity. Be advised that memory requirements for this program exceed the limitations of an 8K system; at 7,171 bytes RAM (7,116

when Line 1 has been deleted, as explained later) it's quite a load, and it requires another 2,000 or so bytes for various string, array and file allocations.

Prior to running *KEYS*, habitual users of machine language programs (ML) will want to replace the keyword MAXRAM in Line 10 with the highest memory address (HIMEM) available to BASIC, thereby reserving memory for your ML applications. For example, if you regularly use the text formatter *Text Power 100* (V1.38), replace MAXRAM with 60415. The entry address for this application is 60416. Failure to observe this single precaution will render ML applications useless.

To load *KEYS* from tape, enter BASIC and type CLOAD"KEYS" then ENTER. Once the program has loaded, set HIMEM for your machine then run it. If no change in the listing is required, simply type CLOAD"KEYS",R. Depress ENTER, and wait for the program to load. Immediately, the screen will clear and the prompt "busy . . ." will appear in the lower left corner. In the intervening five to 18 seconds of initialization, several things will happen. Memory will be allocated for variables, arrays and files. Also, the RAM directory will be read from memory and its contents saved. The address and size of each file will be calculated and stored; and finally, the directory will be sorted

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and a menu screen created and displayed. Note that Line 1 will have been deleted as a part of this process and the soft keys will have been cleared of their default values.

The menu screen is no mere window dressing; the top or status line displays the starting address and size of the file that is currently highlighted and the amount of unused string and numeric memory space. The next five lines are an alphabetized directory (running top to bottom and left to right) of all resident RAM files. This is sorted courtesy of the Shell-Metzner sorting algorithm which appears in lines 30-36 of the listing. Observe that *KEYS* is the lone exception to this regimen in that it is always first in order in the directory, regardless of its position alphabetically.

Filetypes are identified as either 'B' (BASIC), 'C' (command) or 'D' (document), while assignments for future entries are reserved by a series of colons. The solid lines suggest columns of documents, but are primarily for visual effect. The bottom or label line defines the assigned function of each of the eight soft keys and is alternately used to display prompts or to create fields for data input. The algorithms which for-

mat and display the menu screen appear in the listing as lines 40-52. See Figure 1 for various formats of typical *KEYS* screen displays.

How it Works

Though *KEYS* does boast a certain degree of sophistication, its operation is relatively straightforward. For this reason, I will not overburden you by describing salient features which will become apparent as a matter of course. Generally speaking, once a function has been selected, it requires user confirmation prior to its execution. Depressing ESC will cancel a selection while ENTER will execute it. If you make a mistake while keying data, use DEL BKSP to delete it. Note that data is automatically accepted and processed once the final character of a given field length has been keyed. For example, depressing F1 creates a field for inputting six characters of data. If fewer than six are keyed, the user must depress ENTER before this data will be accepted and processed.

The controlling algorithm for this procedure appears as a subroutine in lines 1020-1024 of the listing. Movement between files is accomplished by use of the up or down cursor control

keys only. Observe that as the cursor progresses from file to file, the values of the starting address and file size are advanced to reflect the status of the file over which the cursor is currently positioned. This process is controlled by the routine at lines 54-62 of the listing. Once a function is active, these keys are rendered inoperative. To open a document for editing or to run other BASIC or ML applications, simply position the cursor over the desired file and depress ENTER twice.

F1 OPEN (100-102): Use this key to open as many as 18 new document files. ESC exits the mode and sorts the directory.

F2 DISP (200-214): Use this key to display the selected document file. Depress ENTER to view subsequent screens of data. ESC exits to the menu screen.

F3 FIND (300-324): Use this key to search the selected document file for a string of up to 27 characters in length. This routine is case sensitive, so the search string must match the target string exactly. If found, the target string will be displayed in inverse video and the user will be prompted. Depressing ENTER con-

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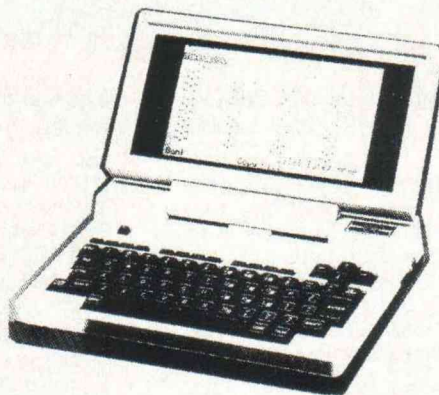
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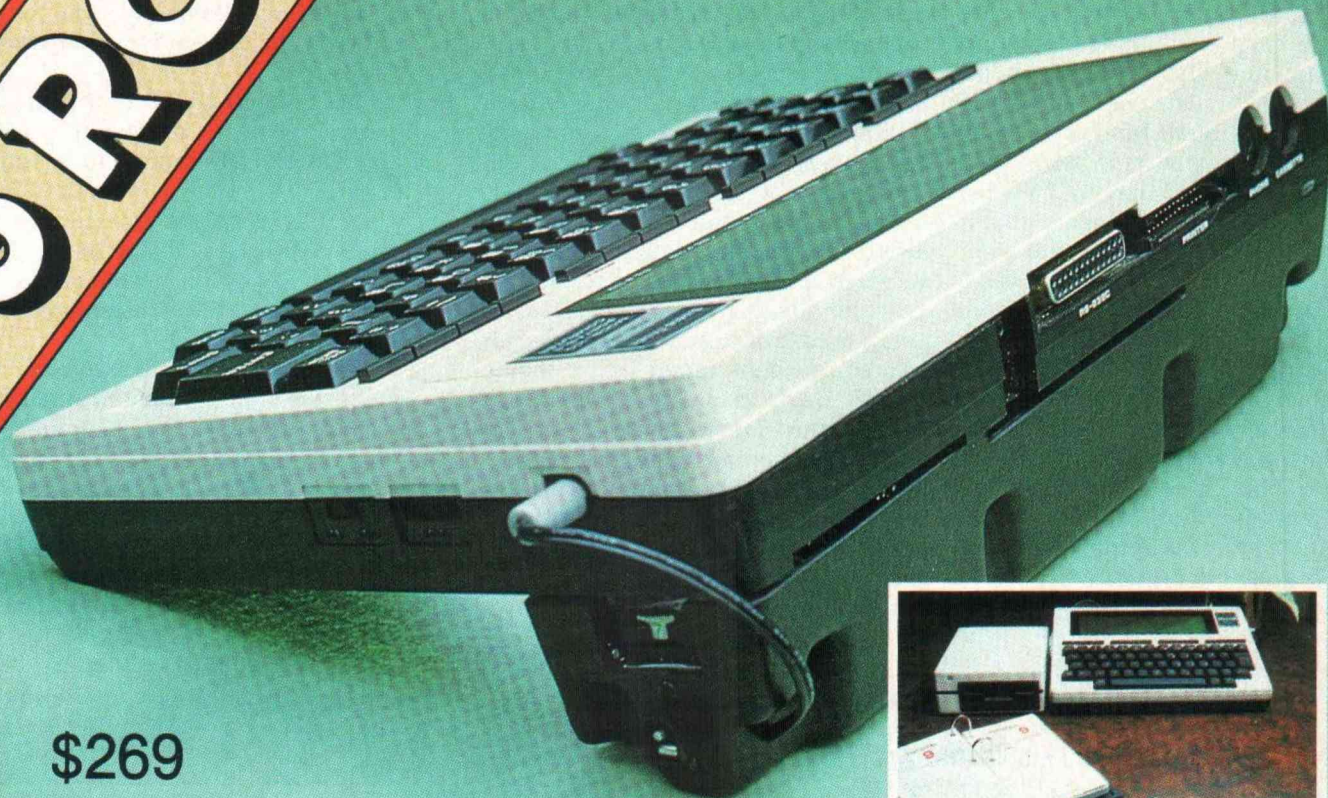
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tinues the search. While active, this routine may be interrupted by depressing F8; otherwise use ESC to exit to the main menu screen.

F4 NAME (400-402): Use this key to rename the selected file. Attempts to rename **KEYS** are ignored. ESC exits the mode and sorts the directory.

F5 TIME (500-510): Depress F5 to display the current time. Note that the time is displayed in the 24 hour or "military" format.

F6 BKUP (600-664): Assuming the recorder is properly connected, depressing F6 allows the user to save or load document files only.

When **SAVE** is selected, you are prompted for a three character string to identify the cassette to which the files will be written. The first two characters are the cassette number and must be in the range 00 to 99. The third character is the side (of the cassette) and must be A or B. Depressing **ENTER** creates a directory which is displayed and written to tape. Note that **BASIC**, **ML** and empty document files are not saved, while documents containing data are dumped en masse to tape storage. Observe also that the date in the upper-left corner is displayed in the military format of year, month and day.

Once the tape backup is completed, the user is prompted to depress **ESC** to return to the main menu screen. A handy feature of this routine (which also is available during tape loads) is the status monitor in the lower-right corner which tracks and displays the amount of data remaining to be written to or restored from tape storage.

When **LOAD** is selected, the user is first prompted to save resident document files. Whether the number of documents is one or 18, all will be deleted to clear space to load files from tape storage (**BASIC** and **ML** files will remain intact). A quick exit will allow you to save your documents (as described above) before proceeding. Once **LOAD** is executed, the directory will be read from tape and displayed. If you do not wish to load the accompanying document files, simply exit the mode; otherwise, depress

ENTER and the documents will be restored.

Though somewhat unconventional, this concept is actually quite practical and eliminates some of the considerable frustration associated with maintaining cassette files; however, it does require a certain degree of acceptance and sacrifice on the part of the user. Documents should remain with the directory in which they are created, and you should continue to use the same directory to create your documents until either **RAM** or directory space (preferably the former) has been exhausted. When these documents are saved, they must always be written to the same area of tape storage (be sure to maintain an accurate record of counter settings). Thus, should you ever need to process a directory, you would merely advance the recorder to the appropriate counter setting and restore the files. After processing, the directory would be returned to its current position on tape.

To illustrate this procedure, let's assume that you have cassette number 00A which contains three directories on side A. The first directory has 18 documents of various sizes beginning at counter number 0. The others have fewer documents, but occupy approximately the same amount of storage space (several of the documents are rather lengthy). Since you're interested in viewing the first directory, you depress F6 and load it from cassette. When the directory is restored, you see a document that you want to delete. After depressing **ENTER** to restore the files, you delete that document, freeing up 1000 bytes of memory. Next, you create a new document of 500 bytes and edit a third. Finally, you rewind the tape and return the directory to storage beginning at counter number 0.

As long as you work within the confines of a directory, you are free to change its contents at will. The directory may be smaller than the maximum length of the tape block which it occupies, but because its expansion could destroy the contents of a neighboring directory, it should never exceed those

limits. Though you are permitted to save and restore an incomplete directory of documents any number of times, you are advised to exhaust as much memory as possible prior to archiving it permanently and beginning a new directory. Thus, should you ever need to recall it, you can alter its contents freely secure in the knowledge that the new directory will occupy the same length of tape storage, thereby preserving the integrity of the system. The result is a cassette "library" of independent directories of documents which may be accessed and processed at random.

F7 KILL (700-792): F7 allows the user to delete files of every type, except that you may not delete **KEYS**. Depress **CODE** to enter the **COMMAND** language/**DOCUMENT** files deletion mode. A "floating" block cursor will appear to the immediate right of the first **ML** or document file in the directory and the label **SLCT** just above the **F1** soft key. Use the up or down cursor control keys to maneuver the cursor between files. Depress **SLCT** to alternately select files, or select files for deletion. Selected files will be displayed in the inverse video format. **ESC** deletes all files and exits the mode, while **ENTER** deletes selected files.

Depressing **BASC** enters the **BASIC** files deletion mode and allows the user to delete one **BASIC** file. On execution, the cursor is positioned over the first **BASIC** file (not **KEYS**) in the directory. Use the cursor control keys to progress from file to file. **ESC** exits the mode or cancels a request to delete a file. Depress **ENTER** twice to delete the file. Subsequent deletions of **BASIC** files will require that the user return to this mode.

F8 QUIT (800-810): Depress F8 to reset the soft keys to their default values and to exit to the **Model 100** menu.

Of the remaining lines, 1000-1092 are subroutines used to integrate functions, while 2000-2002 are error handling routines. If an unexpected or previously undetected error should materialize, Line 2002 will clear the screen and display the error number and the line number which caused the error. □



The listing:

```
Ø 'KEYS-V1.2/LINWOODMCDOWELL/DEC84-16OCT
85/7171BYTES
1 PR$="":GOSUB1Ø7Ø:CLS:PK$="1"+CHR$(13)+
"RUN":GOSUB1Ø3Ø:SAVE"KEYS":END
2 DATA"add:","usd:","str:","mem:
```

```
4 CALL16954:CALL17471:CALL23161:CALL17ØØ
6:CLS:GOSUB1Ø12
1Ø MAXFILES=Ø:CLEARØ,MAXRAM:IFFRE(Ø)<257
3THENBEEP:PRINT@28Ø,"out of memory!
":MENUELSEMAXFILES=2:CLEAR95Ø:DIMF$(2Ø),
F!(2Ø),F(2Ø):SOUNDOFF:ONERRORGOTO2ØØØ
12 NV=17ØØ6:RV=17ØØ1:PB!=PEEK(639Ø9)+PEE
K(6391Ø)*256:LB$="OPEN DISP FIND NAME TI
ME BKUP KILL QUIT ":NM$="KEYS B":Q$=C
```

```

HR$(34):US="#####
20 DR=0:FORX=63930TO64138STEP11:IFPEEK(X)
)=0THEN26ELSEF!=PEEK(X+1)+PEEK(X+2)*256:
DR=DR+1:A=DR:IFA=1THEN24
22 A=A-1:IFF!>F!(A)THENA=A+1ELSEF$(A+1)=
F$(A):F!(A+1)=F!(A):GOTO22
24 F!(A)=F!:F$="":FORXX=1TO6:F$=F$+CHR$(
PEEK(XX+X+2)):NEXT:F$(A)=F$+" "+CHR$(PE
EK(X+9)):IFNM$=F$(A)THENMID$(F$(A),9)="
26 NEXT:F!(DR+1)=PEEK(64434)+PEEK(64435)
*256:FORX=1TODR:F!=F!(X+1):IFPB!>F!(X)AN
DPB!<F!THENF!=PB!
28 F(X)=F!-F!(X)-1:NEXT:A=DR
30 A=INT(A/2):IFA=0THENF$(1)=NM$:GOTO40E
LSEB=1:C=DR-A
32 D=B
34 E=D+A:IFRIGHT$(F$(D),1)+LEFT$(F$(D),8
)>RIGHT$(F$(E),1)+LEFT$(F$(E),8)THENF$=F
$(D):F$(D)=F$(E):F$(E)=F$:F!=F!(D):F!(D)
=F!(E):F!(E)=F!:F=F(D):F(D)=F(E):F(E)=F:
D=D-A:IFD>0THEN34
36 B=B+1:IFB>CTHEN30ELSE32
40 DR$="":FORX=DR+1TO19:F$(X)=STRING$(9,
58):NEXT:F$(20)=SPACE$(9):FORA=1TO5:FORB
=0TO15STEP5:DR$=DR$+F$(A+B)+"u":NEXT:MID
$(DR$,40*A)=" ":NEXT:FORA=1TO4:DR$=DR$+"
qqqqqqqqqx":NEXT:MID$(DR$,240)="q":X=1
50 CLOSE:CALL17471:CALL16954:X(1)=F!(X):
X(2)=F(X):X(3)=FRE(""):A$="":H$="":CH$="
":SR$="":RESTORE2:FORA=1TO4:READB$:A$=A$
+B$+RIGHT$(SPACE$(3)+STR$(X(A)),5)+"u":X
(4)=FRE(0):NEXT:MID$(A$,40)="
52 CALLNV:PRINT@0,A$;DR$:CALLRV:GOSUB101
4:PRINT@280,LB$:CALLNV:PRINT@24,USINGU$;
FRE(""):PRINT@34,USINGU$;FRE(0):CALLRV:K
EYON:GOSUB1002:IFDR>1THEN62
54 KEYON:IK$=INKEY$:IFIK$="ORDR=1THEN54
ELSEKY=ASC(IK$):KEYOFF:IFKY=13THEN64ELSE
IFKY<30ORKY>31THEN54
56 PRINT@INSTR(DR$,F$(X))+39,F$(X):IFKY=
30THENX=X-1ELSEX=X+1:IFX>DRTHENX=1
58 IFX<1THENX=DR
60 CALLRV:PRINT@INSTR(DR$,F$(X))+39,F$(X
)
62 CALLNV:PRINT@4,USINGU$;F!(X):PRINT@14
,USINGU$;F(X):GOTO54
64 IFNM$=F$(X)THEN54ELSEKEYOFF:PR$="run
it?"+"SPACE$(32):IFRIGHT$(F$(X),1)="D"THE
NPR$="edit?"+"SPACE$(34)
66 GOSUB1070:GOSUB1008:GOSUB1040:F$=F$(X
):A=ASC(RIGHT$(F$,1)):IFA=66THENRUNF$ELS
EIFA=67THENRUNMF$ELSEPK$=LEFT$(F$,6):GOS
UB1030:CALL24070
100 IFDR=19THENPR$="directory is full!":
GOTO1052ELSEKEYOFF:CALLRV:PRINT@280,"ope
n file: _____.DO"+"SPACE$(20):GOSUB1060:F
$=F$+SPACE$(9-XX)+"D":IFINSTR(DR$,F$)=0T
HENOPENF$FOROUTPUTAS1:CLOSE:A=0:DR=DR+1:
F$(DR)=F$ELSEERROR55

```

```

102 FORB=0TO30STEP10:FORC=1TO161STEP40:A
=A+1:IFA=DRTHENX=DR:MID$(DR$,B+C)=F$:F$(
X)=F$:GOSUB1014:B1=1:IFDR=19THEN1062ELSE
1000ELSENEXT:NEXT
200 GOSUB1050:KEYOFF:PR$="display it?"+"S
PACE$(28):GOSUB1070
202 GOSUB1008:CALLNV:PRINT@0,SPACE$(140)
;SPACE$(140):CALLRV:PRINTLEFT$(F$(X),6)+
".DO ":CALLNV:CALL16949:A=F!(X):B=A+F(X
)
210 CLS:FORC=ATOB-1:IFCSRLIN<6THENPRINTC
HR$(PEEK(C));:NEXT
212 IFB=CTHENCALL16954:CALLRV:PRINT@306,
"document end!":GOSUB1070
214 A=C:GOSUB1000:IFKY=13ANDB=CORKY=27TH
EN50ELSEIFKY=13THEN210ELSE214
300 GOSUB1050:KEYOFF:CALLRV:PRINT@280,"s
tring :"+Q$+STRING$(27,95)+Q$
302 CU=290:XX=27:GOSUB1020:SR$=IP$:SR=LE
N(SR$):IFSR=27THENSOUND534,4
304 CALLNV:PRINT@0,SPACE$(140);SPACE$(14
0):CALL16949:CALLRV:PRINTLEFT$(F$(X),6)+
".DO :"+Q$+SR$+Q$+SPACE$(27-SR):CALLNV:CA
LL17472:OPENF$(X)FORINPUTAS1:A=F(X):H$="
310 B=70:IFB>ATHENB=AELSEA=A-B
312 IFB=0THEN320ELSECH$=INPUT$(B,1):CH$=
H$+CH$
314 KEY(8)ON:ONKEYGOSUB,,,,,,50:C=INSTR
(CH$,SR$):IFC=0THEN322ELSEKEYOFF:PRINTLE
FT$(CH$,C-1);:CALLRV:PRINTSR$;:CALLNV:SO
UND11172,4:CH$=RIGHT$(CH$,LEN(CH$)+1-C-S
R):IFINSTR(CH$,SR$)=0ANDINSTR(SR$,RIGHT$
(CH$,1))=0THENPRINTCH$;:CH$="
316 GOSUB1000:IFKY=13ANDC>0THEN314ELSEIF
KY<>13THENIFKY=27THEN50ELSE316
320 IFA=BTHENPRINTH$:GOTO50ELSE310
322 C=LEN(CH$):H$=RIGHT$(CH$,SR):IFC>SRT
HENPRINTLEFT$(CH$,C-SR);
324 GOTO320
400 KEYOFF:A$=F$(X):B$=RIGHT$(A$,3):C$="
BACODO":C$="."+MID$(C$,INSTR(C$,RIGHT$(A
$,1)),2):CALLRV:PRINT@280,"change to:"+"
"+C$+SPACE$(20)
402 GOSUB1060:IFA$=NM$THEN400ELSEF$=F$+S
PACE$(7-XX):IFINSTR(DR$,F$+B$)=0THENNAME
LEFT$(A$,6)+C$ASF$+C$:F$(X)=F$+B$:MID$(D
R$,INSTR(DR$,A$))=F$(X):GOSUB1014:B1=1:G
OTO400ELSEERROR55
500 KEYOFF:A$=LEFT$(TIMES$,5):CALLRV:PRIN
T@230,"time:"+"LEFT$(A$,2)+RIGHT$(A$,2)
510 IFA$<>LEFT$(TIMES$,5)THEN500ELSEIK$=I
NKEY$:IFIK$=" "THEN510ELSEGOSUB1006:IFKY=
27THENCALLNV:PRINT@230,SPACE$(9):GOTO105
6ELSE510
600 KEYOFF:PR$="":FORA=1TODR:IFRIGHT$(F$
(A),1)<"D"ORF(A)=0THENNEXT:PR$="no data!
602 CALLRV:PRINT@280,"SAVE LOAD"+"SPACE$(
31)
604 KEY(1)ON:KEY(2)ON:ONKEYGOSUB610,650:

```

```

GOSUB1004:KEYOFF:IFKY=27THEN1054ELSE604
610 KEYOFF:B2=1:IFPR$>" "THENGOSUB1052:GO
TO600ELSEPRINT@280,"cassette :"+Q$+" "
+Q$+SPACE$(7):CU=290:XX=3:GOSUB1020:IFKY
=27THEN602
612 GOSUB1080:FORA=1TO2:IFLEN(F$)<3ORINS
TR("0123456789",MID$(F$,A,1))=0ORINSTR("
AB",RIGHT$(F$,1))=0THENBEEP:GOTO610ELSEN
EXT:PR$="save documents to "+F$+"?":GOSU
B1070
614 GOSUB1004:IFKY<13THENIFKY=27THEN610
ELSE614
620 A=0:B=0:C=1:FORX=1TO19:D=F(X):IFD>0A
NDRIGHT$(F$(X),1)="D"THENA=A+D:B=B+1:F(C
)=D:F$(C)=F$(X):C=C+1
622 F$(X)=STRING$(9,58):NEXT:X=1:FORC=1T
O31STEP10:FORD=0TO161STEP40:MID$(DR$,C+D
)=F$(X):X=X+1:NEXT:NEXT
624 A$="dt: "+RIGHT$(DATE$,2)+LEFT$(DATE$
,2)+MID$(DATE$,4,2)+"utime: "+LEFT$(TIME$
,2)+MID$(TIME$,4,2)+"ufiles: "+RIGHT$(ST
R$(B),2)+"uusr: "+RIGHT$(SPACE$(3)+STR$(A
),5)+"
626 CALLNV:PRINT@0,A$;DR$;:CALLRV:PRINT"
saving to "+F$+" ..."+SPACE$(13)+"sta"+R
IGHT$(A$,7):OPEN"CAS: "FOROUTPUTAS1:PRINT
#1,A,B:PRINT#1,A$:PRINT#1,DR$:PRINT#1,F$
:FORX=1TOB:PRINT#1,F$(X):NEXT:CLOSE:H=A

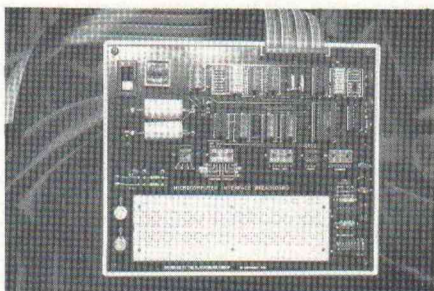
```

```

630 FORX=1TOB:A=F(X):F$=F$(X):CALLRV:GOS
UB1014:OPENF$FORINPUTAS1:OPEN"CAS: "+F$FO
ROUTPUTAS2:PRINT#2,A:GOSUB1090:NEXT:CLOS
E:C=1:PR$="ESC to menu!"+SPACE$(27):IFDR
<19ANDFRE(0)<500THENC=19-DR
632 MOTORON:FORX=1TO1700*C:NEXT:MOTOROFF
:GOSUB1070
634 GOSUB1000:IFKY=27THENGOSUB1012:GOTO1
0ELSE634
650 KEYOFF:PR$="last chance to save docu
ments!":FORA=1TODR:IFRIGHT$(F$(A),1)<"D"
THENB=A:NEXT:PR$="load directory?"ELSESW
=1
652 IFB=19THENB2=1:PR$="delete a file!":
GOSUB1052:GOTO600ELSEGOSUB1070
654 GOSUB1000:IFKY=13THENCALLNV:GOSUB101
4:GOSUB1012ELSEIFKY=27THEN600ELSE654
656 IFSW=1THENFORX=ATODR:KILLEFT$(F$(X)
,6)+"DO":NEXT
658 OPEN"CAS: "FORINPUTAS1:INPUT#1,H,DR,A
$,DR$,F$:IFDR+B>19THENDR=19-B
660 FORX=1TODR:INPUT#1,F$(X):NEXT:CLOSE:
PRINT@0,A$;DR$;"from cassette "+F$
662 GOSUB1000:IFKY<13THENIFKY=27THENGOS
UB1012:GOTO10ELSE662
664 CALLRV:PRINT@280,"loading from "+F$+
" ..."+SPACE$(10)+"sta"+RIGHT$(A$,7):FOR
X=1TODR:F$=F$(X):CALLRV:GOSUB1014:OPEN"C

```

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```
AS:"+F$FORINPUTAS1:OPENF$FOROUTPUTAS2:IN
PUT#1,A:GOSUB1090:NEXT:CLOSE:GOSUB1070:G
OSUB1012:GOTO10
700 IFDR=1THENGOSUB1050ELSEKEYOFF:CALLNV
:GOSUB1014:H=X:GOSUB792
702 CALLRV:PRINT@280,"CODO BASC"+SPACE$(
30):SW=0:K$=SPACE$(34)+"basic":PR$="no f
iles!
704 KEY1,"a":KEY2,"b":GOSUB1000:IFKY<>22
5THENIFKY=226THENGOSUB792:IFD=1THENB2=1:
GOSUB1052:GOTO702ELSEPRINT@280,K$:X=2:GO
TO766ELSEIFKY=27THENCALL23161:X=H:GOSUB1
014:GOTO1054ELSE704
706 IFD=DRTHENB2=1:GOSUB1052:GOTO702ELSE
PRINT@280,"SLCT"+SPACE$(26)+"comd/docu":
CALLNV:GOTO718
710 GOSUB1000:CALLNV:IFKY=13ANDSW>0THEN7
30ELSEIFKY=27THENGOSUB790:GOSUB792:PRINT
@40,DR$:GOTO702ELSEIFDR=D=1ORKY<3ORKY>3
1THENIFKY=225THEN720ELSE710
712 B=INSTR(DR$,LEFT$(F$(X),9))+8:PRINT@
B+40,MID$(DR$,B+1,1)
714 IFKY=30THENX=X-1ELSEX=X+1:IFX>DRTHEN
X=1
716 IFX<1THENX=DR
718 IFRIGHT$(F$(X),1)="B"THEN714ELSEPRIN
T@INSTR(DR$,LEFT$(F$(X),9))+48,"i":GOTO7
10
720 F$=F$(X):IFLEN(F$)=9THENSW=SW+1:F$(X
)=F$+"0":CALLRVELSESW=SW-1:F$(X)=LEFT$(F
$,9)
722 PRINT@INSTR(DR$,LEFT$(F$,9))+39,LEFT
$(F$(X),9):GOTO710
730 GOSUB1012:FORX=2TODR:F$=F$(X):IFLEN(
F$)>9THENKILLLEFT$(F$,6)+RIGHT$(F$,2)
732 NEXT:GOTO10
750 GOSUB1000:IFKY=13THENPR$="delete it?
":GOSUB1070:GOTO770ELSEIFKY=27THENB2=1EL
SEIFD=2ORKY<3ORKY>31THEN750
760 GOSUB1014:IFB2=1THENB2=0:GOTO702
762 IFKY=30THENX=X-1ELSEX=X+1:IFX>DTHENX
=2
764 IFX<2THENX=D
766 CALLRV:GOSUB1014:CALLNV:GOTO750
770 GOSUB1000:IFKY<>13THENIFKY=27THENPRI
NT@280,K$:GOTO766ELSE770
772 FORA=8TO1STEP-1:IFMID$(F$(X),A,1)="
"THENNEXTELSEPK$="GOTO10":CALLNV:PRINT@2
80,PK$+SPACE$(34):GOSUB1030:KILLLEFT$(F$
(X),A)+"BA":END
790 FORX=2TODR:F$(X)=LEFT$(F$(X),9):NEXT
:RETURN
792 D=0:FORX=1TODR:IFRIGHT$(F$(X),1)<"C"
THEND=D+1:NEXT:RETURNELSERETURN
800 KEYOFF:PR$="quit?"+"SPACE$(34):GOSUB1
070
810 GOSUB1000:IFKY=13THENGOSUB1040:MAXFI
LES=0:MENUELSEIFKY=27THENKEYON:GOTO1054E
```

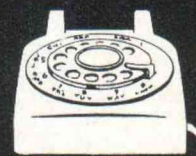
```

LSE810
1000 IK$=INKEY$:GOSUB1002:IFIK$=""THEN10
00ELSE1006
1002 ONKEYGOSUB100,200,300,400,500,600,7
00,800:RETURN
1004 IK$=INKEY$:IFIK$=""THEN1004
1006 KY=ASC(IK$):RETURN
1008 GOSUB1000:IFKY=13THENRETURNELSEIFKY
=27THEN1054ELSE1008
1012 CALL17006:PRINT@280,"busy ..."+SPAC
E$(32):RETURN
1014 PRINT@INSTR(DR$,F$(X))+39,F$(X):RET
URN
1020 IP$="":FORCH=1TOXX:GOSUB1022:IFKY=2
7THENIFB2=1THENB2=0:RETURNELSE1054ELSEIF
IP$=""THEN1020ELSEIFKY>13ANDCH<XXTHENNEX
TELSERETURN
1022 PRINT@CU+CH," ":PRINT@CU+CH,,:X$=IN
PUT$(1):KY=ASC(X$):IFKY>31THENPRINTX$:IP
$=IP$+X$:RETURNELSEIFKY=13ORKY=27THENRET
URNELSEIFKY=8ANDCH>1THENCH=CH-1:IP$=LEFT
$(IP$,CH-1):PRINT@CU+CH," _
1024 GOTO1022
1030 PK$=PK$+CHR$(13):FORB=1TOLEN(PK$):P
OKE65449+2*B,ASC(MID$(PK$,B,1)):POKE6545
0+2*B,0:NEXT:POKE65450,B-1:RETURN
1040 CLS:CALLNV:CALL17472:CALL23164,0,23
366:CALL27795:RETURN
1050 IFDR=1THENPR$="no files!"ELSEIFRIGH
T$(F$(X),1)<"D"THENPR$="not a document!"
ELSEIFF(X)=0THENPR$="file is empty!"ELSE
RETURN
1052 KEYOFF:BEEP:CALLRV:PRINT@280,PR$+SP
ACE$(39-LEN(PR$)):FORA=1TO600:NEXT:PR$="
":IFB2=1THENB2=0:RETURN
1054 PRINT@280,LB$
1056 CALLNV:PRINT@24,USINGU$;FRE(""):PRI
NT@34,USINGU$;FRE(0)-1:KEYON:GOSUB1002:G
OTO54
1060 CALL23161:B2=1:CU=289:XX=6:GOSUB102
0:IFKY<>27THENGOSUB1080:RETURN
1062 IFB1=1THENGOSUB1012:GOTO10ELSE1054
1070 KEYOFF:CALL17001:PRINT@280,PR$:FORV
=1TO2:SOUND622,2:FORW=1TO20:NEXT:NEXT:PR
$="":RETURN
1080 F$="":FORXX=1TOLEN(IP$):A=ASC(MID$(
IP$,XX,1)):IFA>96AND<123THENA=A-32
1082 F$=F$+CHR$(A):NEXT:RETURN
1090 C=255:IFC>ATHENC=A
1092 A=A-C:H=H-C:PRINT@314,USINGU$;H:PRI
NT#2,INPUT$(C,1):IFH=0THENRETURNELSEIFA
=0THENCLOSE:CALLNV:GOSUB1014:RETURNELSE1
090
2000 CALLNV:CALL16954:IFERR=7THENCLS:BEE
P:PRINT@280,"clearing memory ...":GOTO10
ELSEIFERL=658THENCLOSE:RESUME658ELSEIFER
R=55THENBEEP:IFERL=100THENRESUME100ELSER
ESUME400
2002 CLS:PRINTERR;ERL:END

```

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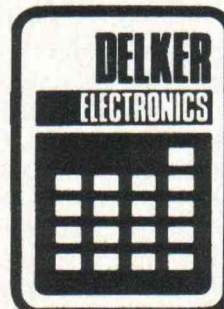
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Create your own MS-DOS menus with
this month's program

More Menu, A La Carte!

By John B. Harrell III

I hope you enjoyed the menu program contained in my last column. This month's addition provides an easy installation program to allow you to change parts of the menu at will. For example, I change the colors of my menu frequently to "spice up" my office.

Remember, this program and MENU.COM (from the last column) are specifically for the Tandy 2000 and *will not run* on the Tandy models 1000 and 1200. If you are interested, send me a mailer with the correct return postage on it and I will send you a menu "demo" disk with the correct working software. This offer applies to all Tandy MS-DOS computers and *true* IBM compatibles.

Menu Installation

My original version of MENU was a "pain" — I had to continually reassemble the source code whenever I made even simple changes. Imagine an office with many computers, all different, and you will realize there has to be an easier way. I'm going to explain the code in Program Listing 1 — it also pertains to the code on the "demo" disk for the Tandy 1000 and 1200, although the line number references will not be the same.

The "easier way" is contained in Program Listing 1 and is the result of a simple reordering of the original assembly code. This reordering allows all of the pertinent information to be found right at the beginning of the

"COM" file. In fact, data is organized into records of 44 bytes each and is accessed using BASIC's GET and PUT file statements.

First, the statements in lines 60 through 90 determine if the MENU.COM file is present and then they open the file for random access with a record length of 44 bytes. First opening the file for input ('I' option) determines if the file is present on the disk drive. If you attempt to open the file for random access ('R' option) and it is not present, BASIC will create the file.

The first "record" contains the menu color information (C1\$ through C5\$), the amount of delay allowed prior to blanking the screen (N.D\$) and the number of menu entries (N.E\$). These items are extracted from the string oriented variables using the proper BASIC statements to convert them to binary values.

The program segment from lines 150 through 220 initializes the colors properly for your monitor. If you do not have a color monitor, the colors are set to default values for the monochrome monitor. Otherwise, the colors are set to default to the ones currently installed in MENU.COM.

Tandy 1000 users must select the color option *even if they have a monochrome monitor*. This is because the 1000 "thinks" it always has color installed, i.e. the video RAM segment is in the same location for either option. The IBM-PC, Tandy 1200 and compatibles must select the correct option for color as this establishes the proper segment address for the video RAM.

If you selected the color option (and have a color monitor), the screen is cleared and the code segment between

lines 230 and 680 permits you to try out colors for each of the menu sections and instantly see the changes on the screen. You may properly visualize what your final menu will resemble because a small menu "window" is displayed using the appropriate attributes.

You select each color in response to the flashing prompt displayed in the middle of the screen. Press any key corresponding to a color and it will be instantly displayed. The color numbers under the COLOR statement in the BASIC reference manual provide a full explanation of these numbers — options 'A' through 'F' correspond to the decimal colors from 10 to 15 respectively.

IBM compatibles will not see the flashing prompt as I removed the "flash" option to prevent an incompatibility with GW-BASIC on the Tandy Model 1000. You will also see another difference here — these computers allow up to *eight* different colors to be selected. (Why? Wait until next month).

Lines 680 through 740 allow you to choose the length of time the computer may be inactive prior to blanking the video screen. The acceptable range of time is from one second to 10 minutes.

This exhausts most of the data in record number one, and the next part of the program (lines 750 through 890) extracts the current menu title from record number two. After displaying it on the screen, you are given the option to change it. The title may be any character string up to 43 characters in length *not including the character '\$'*.

The title string is terminated by the '\$' character. This string and each of the menu option strings are identical — 43 characters of text terminated by a single '\$'. The resultant string has a maximum

(John B. Harrell III has written for microcomputer magazines for three years. He holds a bachelor's degree in computer science and is a software technical expert for navy electronic support measures systems.)

length of 44 bytes and is stored in one of the succeeding records. The title string is centered for proper display if it is less than 43 bytes.

The text of the currently installed menu options (up to N.ENTRY items) is read from the next records in MENU.COM by the statement in Line 910. Next, you are told how many options are installed and given the opportunity to change these options.

On the demo disk, all 12 menu options have text installed. When you elect to change the menu text section, you are told that 12 options are currently installed. If you proceed, the next section of code tells you to enter the number of allowed user options (up to 10). Remember that MENU.COM reserves the last two options for formatting a disk drive and for exiting to DOS.

When you change the menu text, a simplified prototype of the menu is displayed with the current title and currently installed menu options text. Note that the last two items have already been changed to reflect the number of entries you selected and that the list of options has been properly truncated if you selected less than 10 user options, or extended if you select more than were currently installed.

Press the letter key corresponding to any user-installed options and you are allowed to enter the menu text. Again, do not use the '\$' character as an abbreviated message will result.

When you are finished installing the text for your menu options, press the ENTER key and you are presented with the last selection — update MENU.COM or restart. Updating the file writes all of the new information in MENU.COM and closes the file.

That's all there is to it. If you followed the directions in the last column for setting up the directories and batch files, you should now have a fully working menu system for your MS-DOS computer system.

Menu Dessert Section

If you have used MENU, you will have noticed one item that is annoying. There is a noticeable delay from the time a user key is pressed until the first command is displayed on the screen. This is because the EXEC call to MS-DOS loads the file COMMAND.COM prior to processing the batch file.

IBM compatibles can rid themselves of this annoying delay by using PC-DOS Version 3.XX on their computers. Install a small RAM disk (it comes with

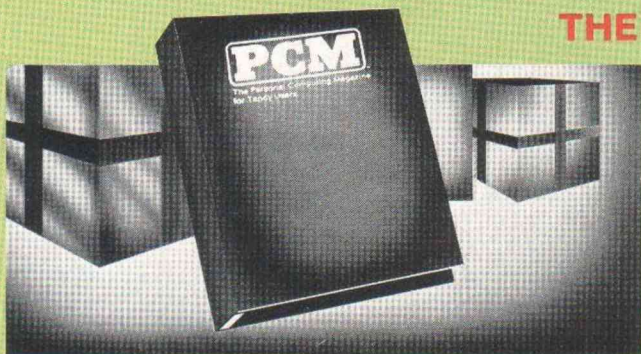
the operating system) of about 30K and copy COMMAND.COM to it.

Next, set the file environment up using the DOS SET command to reflect the location of this new version of COMMAND.COM. For example, on my IBM-PC/XT, the RAM disk becomes Drive 'F' and the following DOS command instructs the system to load COMMAND.COM from this drive:

Set Comspec=f:\command.com

Make sure you correctly set up all of these features prior to loading MENU.COM. I use my AUTOEXEC batch file to correctly set everything as I boot up. This PC-DOS procedure works fine on the Tandy 1200, as well as on the Tandy 1000HD. Unfortunately, this will not work on the older version 2.XX MS-DOS, so the Tandy 2000 users are stuck until Radio Shack sees fit to release the newer version for this machine.

Again, save your fingers and send me a pre-paid mailer for the demo disk containing MENU.COM for the 1000, 1200 and 2000. My address is LCDR J. B. Harrell, III, 1519-A Carswell Circle, Bolling Air Force Base, Washington, D.C. 20336. If you are really interested, I may also be coerced into parting with the assembly source code.



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Next Month

For the start of the New Year, I will begin a series of articles exploring advanced topics for your computer systems. In the first article, I will explain how to directly access the video memory of your computer system.

In this initial installment we will explore how to write text in various colors and attribute to the monochrome and color monitors. I will also present the code necessary to determine when the video monitor is in its horizontal retrace mode so that you don't leave

"little sparkles" all over the video screen (a common problem with IBM-PCs and the like).

I am going to try presenting this code in *Turbo PASCAL* as a universal publication language, or program design language (PDL). Ah, I hear the cries from the mob — no, this is not a "slam" for any other language or an endorsement for *Turbo PASCAL*. It is simply a statement of fact — the language is self-documenting, easily transportable into any other language and cheap!

I also do not want to leave you with the feeling that I advocate this machine-

dependent type of programming. Simple code segments are often the best. We sometimes must sacrifice simple code and portability for superior performance, and this is the thrust of my column. MS-DOS has several vehicles for output and they are fine in most cases.

Following this discussion, I will look at how the computers display graphics on the video screen and how to program for sounds from your computer when your favorite language is missing this feature. Let me know what your desires are and have a Happy New Year! □

The listing:

```
10 DEFINT A-Z
20 SCREEN 0,0,0
30 CLS:KEY OFF
40 LOCATE 4,32: PRINT "MENU INSTALLATION"
50 LOCATE 6,29: PRINT "by John B. Harrell, III"
60 ON ERROR GOTO 1920
70 OPEN "I",1,"MENU.COM": CLOSE 1
80 ON ERROR GOTO 0
90 OPEN "R",1,"MENU.COM",44
100 FIELD 1,44 AS TXT$
110 FIELD 1, 3 AS D1$, 1 AS C1$, 1 AS C2$, 1 AS C3$, 1 AS C4$,
1 AS D2$, 1 AS C5$, 2 AS D3$, 2 AS N.D$, 2 AS D4$, 1 AS N.E$,
28 AS D5$
120 GET 1
130 CLR.1 = ASC(C1$): CLR.2 = ASC(C2$): CLR.3 = ASC(C3$): CLR.4 =
ASC(C4$)
140 CLR.5 = ASC(C5$): N.DELAY = CVI(N.D$): N.ENTRY = ASC(N.E$)
150 LOCATE 15,23: PRINT "Do you have a color monitor (Y/N)? ";
160 GOSUB 1770
170 CLR.MONITOR = Z$="Y"
180 A$="Color monitor": IF CLR.MONITOR THEN A$=A$+" selected!"
ELSE A$=A$+" not selected!"
190 LOCATE 17,(80-LEN(A$))/2: PRINT A$
200 FOR I=1 TO 3000:NEXT
210 IF NOT CLR.MONITOR THEN CLR.1=0: CLR.2=7: CLR.3=15:
CLR.4=0: CLR.5=7
220 OUT &H198,CLR.1: OUT &H19A,CLR.2: OUT &H19C,CLR.3: OUT
&H19E,CLR.4
230 CLS
240 LOCATE 2,35:COLOR 15,7:PRINT
CHR$(&HC9);STRING$(9,&HCD);CHR$(&HBB);
250 LOCATE 3,35
260 PRINT CHR$(&HBA);" ";CHR$(&HBA);
270 LOCATE 4,35:PRINT CHR$(&HCC);STRING$(9,&HCD);CHR$(&HB9);
280 FOR I=1 TO 3:LOCATE I+4,35
290 PRINT CHR$(&HBA);" ";CHR$(&HBA);
300 NEXT
310 LOCATE 8,35:PRINT CHR$(&HC8);STRING$(9,&HCD);CHR$(&HBC);
320 LOCATE 3,36: COLOR 15,0: PRINT " TITLE ";
330 COLOR 15,7
340 FOR I = 1 TO 3: LOCATE I+4,37: PRINT CHR$(64+I)+".
"+STRING$(3,64+I);: NEXT
350 COLOR 7,0: LOCATE 12,27:PRINT "Example ";;
```

```

360 COLOR 16,7: PRINT "reverse video";
370 COLOR 7,0: PRINT " text";
380 IF NOT CLR.MONITOR THEN LOCATE 25,27: PRINT "Press any key to
continue";: GOSUB 1810: GOTO 680
390 LOCATE 25,1: PRINT "Select color
(0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F) or press ENTER for next
selection";
400 LOCATE 15,17: COLOR 18,0
410 PRINT "Enter color selection for the screen background";
420 CLR = CLR.1: V.PORT = &H198: GOSUB 1860: CLR.1 = CLR
430 COLOR 7,0: LOCATE 15,17: PRINT STRING$(47,32);
440 LOCATE 15,11: COLOR 16,7
450 PRINT "Enter color selection for the highlighted flashing
prompts";
460 CLR = CLR.2: V.PORT = &H19A: GOSUB 1860: CLR.2 = CLR
470 COLOR 7,0: LOCATE 15,11: PRINT STRING$(58,32);
480 LOCATE 15,13: COLOR 31,0
490 PRINT "Enter color selection for the frame border and menu
text";
500 CLR = CLR.3: V.PORT = &H19C: GOSUB 1860: CLR.3 = CLR
510 COLOR 7,0: LOCATE 15,11: PRINT STRING$(58,32);
520 LOCATE 15,18: COLOR 31,7
530 PRINT "Enter color selection for the menu background";
540 CLR = CLR.4: V.PORT = &H19E: GOSUB 1860: CLR.4 = CLR
550 COLOR 7,0: LOCATE 15,18: PRINT STRING$(46,32);
560 LOCATE 17,14:PRINT "Are you satisfied with these color
selections (Y/N)?"

```



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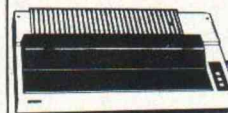
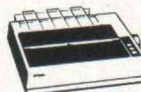
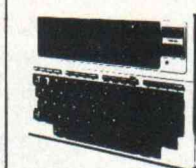
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```

570 GOSUB 1770: IF Z$="Y" THEN GOTO 600
580 LOCATE 17,14: PRINT STRING$(52,32);
590 GOTO 400
600 CLS:LOCATE 4,1
610 PRINT "MENU will display a flashing prompt similar to the one
below when"
620 PRINT "the specified time limit is reached. Select the color
for it:"
630 LOCATE 25,1: PRINT "Select color
(0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F) or press ENTER for next
selection";
640 OUT &H19C,0: OUT &H19E,CLR.5: COLOR 31,7
650 LOCATE 9,23: PRINT "Press any key to display the menu";
660 CLR = CLR.5: V.PORT = &H19E: GOSUB 1860: CLR.5 = CLR: COLOR
7,0
670 CLS: OUT &H19C,CLR.3: OUT &H19E,CLR.4
680 CLS: LOCATE 4,1
690 PRINT "MENU will presently clear the video screen
after";N.DELAY;"seconds of inactivity."
700 PRINT "Do you wish to change this time delay (Y/N)?";
710 GOSUB 1770: IF Z$="N" THEN GOTO 750
720 PRINT: PRINT
730 INPUT "Enter the time (1-600 seconds)"; N.DELAY
740 IF N.DELAY <= 0 OR N.DELAY > 600 THEN GOTO 720
750 CLS: LOCATE 4,1
760 GET 1
770 TITLE$ = TXT$

```

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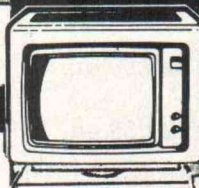
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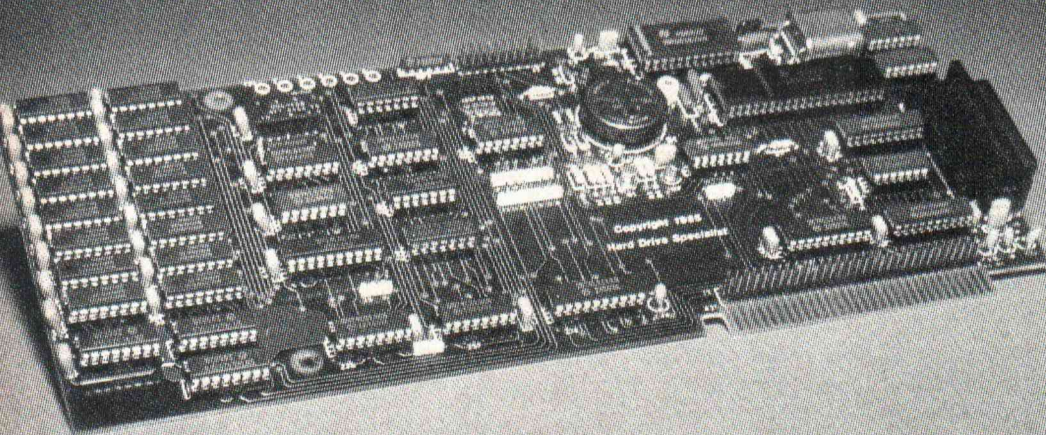
```

780 WHILE LEFT$(TITLE$,1)=" ":
TITLE$=RIGHT$(TITLE$,LEN(TITLE$)-1):WEND
790 WHILE
RIGHT$(TITLE$,1)<>"$":TITLE$=LEFT$(TITLE$,LEN(TITLE$)-1):WEND
800 TITLE$=LEFT$(TITLE$,LEN(TITLE$)-1)
810 PRINT "The menu title is currently set to:"
820 LOCATE 6,(80-LEN(TITLE$))/2: COLOR 31,0: PRINT TITLE$;: COLOR
7,0
830 LOCATE 8,1: PRINT "Do you want to change it (Y/N)? ";
840 GOSUB 1770: IF Z$="N" THEN GOTO 880
850 TITLE$="": LOCATE 10,18: PRINT STRING$(43,250);
860 LOCATE 10,16: INPUT TITLE$
870 IF TITLE$="" OR LEN(TITLE$)>43 THEN LOCATE 10,18: PRINT
STRING$(62,32): GOTO 850
880 TITLE$=TITLE$+"$"
890 IF LEN(TITLE$)<>44 THEN
TITLE$=STRING$((44-LEN(TITLE$))/2,32)+TITLE$:
TITLE$=TITLE$+STRING$(44-LEN(TITLE$),32)
900 DIM TEXT$(12)
910 FOR I=1 TO N.ENTRY: GET 1: TEXT$(I) = TXT$: NEXT
920 CLS
930 LOCATE 4,1
940 PRINT "Menu will currently allow up to";N.ENTRY;"options to be
entered. Do you"
950 PRINT "want to change the number of options or the text
entries (Y/N)?";
960 GOSUB 1770: IF Z$="N" THEN CLS: GOTO 1520
970 TEXT$(N.ENTRY-1)="": TEXT$(N.ENTRY)="": N.ENTRY=N.ENTRY-2
980 PRINT: PRINT
990 PRINT "How many menu options do you want to specify
(1-10)? Remember"
1000 PRINT "that the last two options are used by MENU for
formatting disks"
1010 PRINT "and for exiting to the DOS command level";: INPUT
N.NTRY
1020 IF N.NTRY < 1 OR N.NTRY > 10 THEN 980
1030 COLOR 7,0:CLS
1040 COLOR 15,7
1050 LOCATE 1,10:PRINT CHR$(&HC9);STRING$(60,&HCD);CHR$(&HBB);
1060 LOCATE 2,10:PRINT CHR$(&HBA);STRING$(60,&H20);CHR$(&HBA);
1070 LOCATE 3,10:PRINT CHR$(&HCC);STRING$(60,&HCD);CHR$(&HB9);
1080 FOR I=1 TO 12
1090 LOCATE 3+I,10:PRINT CHR$(&HBA);STRING$(60,&H20);CHR$(&HBA);
1100 NEXT
1110 LOCATE 16,10:PRINT CHR$(&HC8);STRING$(60,&HCD);CHR$(&HBC);
1120 COLOR 15,0:LOCATE 2,11:PRINT STRING$(60,32);
1130 TTL$=TITLE$: IF INSTR(TTL$,"$")<>0 THEN
MID$(TTL$,INSTR(TTL$,"$"),1)=" "
1140 LOCATE 2,(80-LEN(TTL$))/2: PRINT TTL$;: COLOR 15,7
1150 IF N.NTRY > N.ENTRY THEN I=N.ENTRY+1: WHILE I <= N.NTRY:
TEXT$(I)=CHR$(I+64)+" ". I=I+1: WEND
1160 FOR I=1 TO N.ENTRY
1170 WHILE RIGHT$(TEXT$(I),1)<>"$": TEXT$(I)=LEFT$(TEXT$(I),
LEN(TEXT$(I))-1): WEND
1180 TEXT$(I)=LEFT$(TEXT$(I),LEN(TEXT$(I))-1)
1190 NEXT
1200 N.ENTRY=N.NTRY
1210 TEXT$(N.ENTRY+1)=CHR$(N.ENTRY+1+64)+" ". Format a floppy

```

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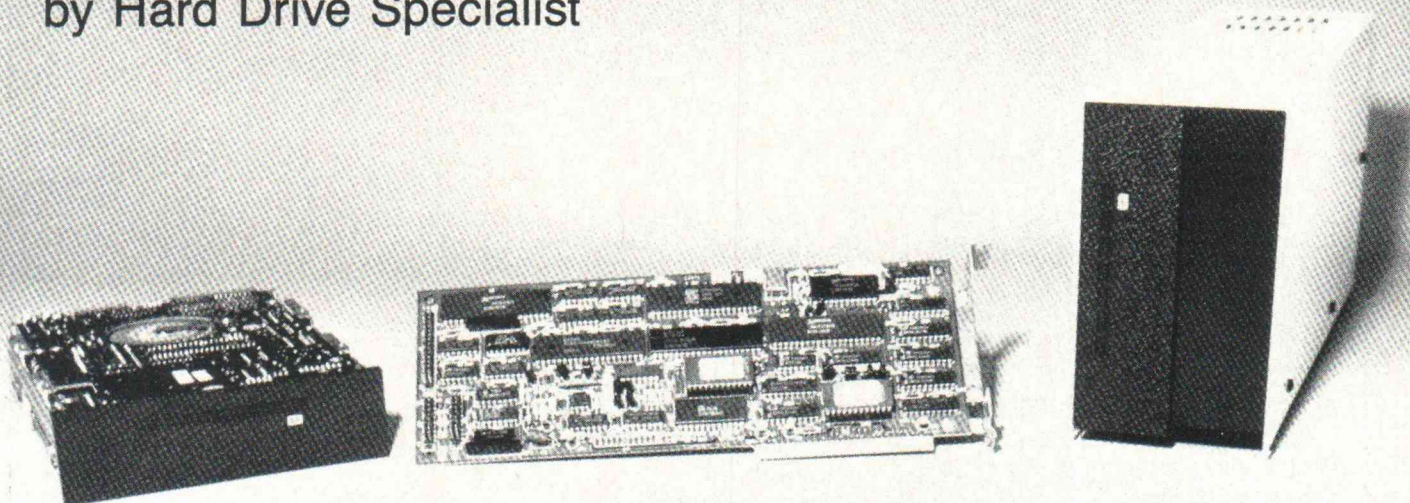
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diskette in drive A:"
1220 TEXT$(N.ENTRY+2)=CHR$(N.ENTRY+2+64)+" . Exit to the MS-DOS
command level"
1230 N.ENTRY=N.ENTRY+2
1240 FOR I=1 TO N.ENTRY
1250 LOCATE I+3,20:PRINT TEXT$(I);
1260 NEXT
1270 COLOR 7,0
1280 LOCATE 25,8:PRINT "Press the letter corresponding to the
option to change or ENTER";
1290 COLOR 15,7
1300 Z$=""
1310 WHILE Z$<>CHR$(13)
1320 GOSUB 1810
1330 IF Z$=CHR$(13) THEN GOTO 1430 ELSE Z$=CHR$(ASC(Z$) AND &HDF)
1340 IF Z$<"A" OR Z$>CHR$(64+N.ENTRY-2) THEN GOTO 1430
1350 TMP$=""
1360 LOCATE 18,23: PRINT STRING$(40,250);
1370 LOCATE 18,21: INPUT TMP$
1380 IF TMP$="" OR LEN(TMP$)>40 THEN LOCATE 18,23: PRINT
STRING$(56,32);: LOCATE 18,23: PRINT STRING$(55,250);: GOTO 1350
1390 COLOR 7,0:LOCATE 18,21:PRINT STRING$(42,32);:COLOR 15,7
1400 TEXT$(ASC(Z$)-64)=Z$+" . "+TMP$
1410 LOCATE 3+ASC(Z$)-64,23: PRINT STRING$(40,32);
1420 LOCATE 3+ASC(Z$)-64,20: PRINT TEXT$(ASC(Z$)-64);
1430 WEND
1440 FOR I=1 TO N.ENTRY

```

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1450 TEXT$(I) = TEXT$(I)+"$"
1460 NEXT
1470 COLOR 7,0:CLS
1480 FOR I=1 TO N.ENTRY
1490 IF LEN(TEXT$(I)) = 44 THEN GOTO 1510
1500 TEXT$(I) = TEXT$(I) + STRING$(44-LEN(TEXT$(I)),32)
1510 NEXT
1520 LOCATE 4,1:PRINT "This completes the menu changes
allowed. If you are satisfied"
1530 PRINT "press the [Y] key to update MENU.COM. Press the
[N] key to begin"
1540 PRINT "the menu selections over."
1550 PRINT:PRINT "Update MENU.COM on the disk (Y/N)?";
1560 GOSUB 1770: IF Z$="Y" THEN 1590
1570 PRINT:PRINT "Do you want to continue - [N] to abort (Y/N)?";
1580 GOSUB 1770: IF Z$="N" THEN SYSTEM ELSE RUN
1590 GET 1,1
1600 LSET C1$ = CHR$( CLR.1 )
1610 LSET C2$ = CHR$( CLR.2 )
1620 LSET C3$ = CHR$( CLR.3 )
1630 LSET C4$ = CHR$( CLR.4 )
1640 LSET C5$ = CHR$( CLR.5 )
1650 LSET N.D$ = MKI$(N.DELAY)
1660 ' LSET VM$ = MKI$(VIDEO.MEM)
1670 ' LSET SM$ = CHR$(SCR.MODE)
1680 LSET N.E$ = CHR$(N.ENTRY)
1690 PUT 1,1
1700 LSET TXT$ = TITLE$
1710 PUT 1
1720 FOR I = 1 TO 12
1730 LSET TXT$ = TEXT$(I)
1740 PUT 1
1750 NEXT
1760 CLOSE 1:SYSTEM
1770 GOSUB 1810
1780 Z$=CHR$(ASC(Z$) AND &HDF)
1790 IF Z$<>"Y" AND Z$<>"N" THEN 1770
1800 RETURN
1810 Z$=""
1820 WHILE Z$=""
1830 Z$=INKEY$
1840 WEND
1850 RETURN
1860 GOSUB 1810
1870 IF ASC(Z$) = 13 THEN RETURN
1880 IF Z$>="0" AND Z$<="9" THEN CLR = ASC(Z$) - 48: OUT
V.PORT,CLR: GOTO 1860
1890 Z$ = CHR$(ASC(Z$) AND &HDF)
1900 IF Z$>="A" AND Z$<="F" THEN CLR = ASC(Z$) - 55: OUT
V.PORT,CLR: GOTO 1860
1910 GOTO 1860
1920 COLOR 0,7:PRINT CHR$(7);" File MENU.COM does not exist
";CHR$(7)
1930 COLOR 7,0:PRINT "Press any key to try again after changing
disks or press"
1940 PRINT "BREAK to abort."
1950 GOSUB 1810
1960 RESUME 70

```

A man in a dark suit, white shirt, and dark tie stands against a dark background. He holds a tall stack of approximately 20 floppy disks in his left hand and a single floppy disk in his right hand. The floppy disks have a distinctive rainbow-colored label with the word "TANDY" printed on it. The text "TAKE YOUR PICK." is superimposed in large, bold, white capital letters over the man's chest.

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Holiday Wrappings

With Wayne Sanders, Curator

The featured exhibit this month is a computer holiday wrapping paper program by Kevin Norwood of Los Angeles, California.

Use a screen dump of the display to create a truly personal gift wrap. You might want to personalize it even more by adding "to" and "from" names to the display. A screen dump made on Tandy's CGP-220 Color Ink-Jet Printer is especially nice.

This program runs on either a Tandy 1000 or Tandy 2000. If you will be running it on a 2000, change the first line of the program to read MODEL=2000.

If you would like to have your computer creation presented here, send it in. A winning gallery exhibit is chosen each month and the "artist" is awarded \$50. Address your entries to PCM Gallery, P.O. Box 385, Prospect, KY 40059. □



The listing:

```
1000 MODEL=1000
1010 IF MODEL=2000 THEN SCREEN 3:RR=2
1020 IF MODEL=1000 THEN CLEAR ,,,32768!:SCREEN 5:RR=1
1030 CLS:KEY ON:KEY OFF:TS=1.745329E-02
1040 FOR I=0 TO 7:PALETTE I,I:NEXT I
1050 ' Draw ribbons
1060 LINE (0,0)-(359*RR,199*RR),15,BF:LINE (0,89*RR)-(359*RR,111*RR),0,B
1070 LINE (0,90*RR)-(359*RR,110*RR),14,BF:LINE (0,92*RR)-(359*RR,108*RR),4,BF
1080 FOR X=1 TO 359 STEP 2:LINE (X*RR,92*RR)-(X*RR,108*RR),0:NEXT X
1090 LINE (149*RR,0)-(171*RR,199*RR),0,B:LINE (150*RR,0)-(170*RR,199*RR),14,BF
1100 LINE (152*RR,0)-(168*RR,199*RR),4,BF
1110 FOR Y=1 TO 199 STEP 2:LINE (152*RR,Y*RR)-(168*RR,Y*RR),0:NEXT Y
1120 C=2:GOSUB 1280
1130 PAINT (150*RR,80*RR),2,2:PAINT (170*RR,80*RR),2,2
1140 PAINT (170*RR,100*RR),2,2:PAINT (170*RR,120*RR),2,2
```

```

1150 PAINT (150*RR,120*RR),2,2:PAINT (150*RR,100*RR),2,2
1160 C=0:GOSUB 1280
1170 ' Draw berries
1180 FOR S=10 TO 2 STEP -4
1190   FOR J=0 TO S
1200     I=6.26/S*J
1210     X=SIN(I)*S+160:Y=COS(I)*S+100
1220     CIRCLE (X*RR,Y*RR),3*RR,7:PAINT (X*RR,Y*RR),7,7
1230     CIRCLE (X*RR,Y*RR),3*RR,0
1240     IF INT(RND*2)=1 THEN PAINT(X*RR,Y*RR),4,0
1250   NEXT J
1260 NEXT S
1270 GOTO 1270
1280 ' Draw leaves
1290 CIRCLE ((160-20)*RR, 90*RR),20*RR,C,210*TS,330*TS
1300 CIRCLE ((160-20)*RR,110*RR),20*RR,C,30*TS,150*TS
1310 CIRCLE ((160+20)*RR, 90*RR),20*RR,C,210*TS,330*TS
1320 CIRCLE ((160+20)*RR,110*RR),20*RR,C,30*TS,150*TS
1330 CIRCLE ((160+21)*RR,85*RR),20*RR,C,95*TS,210*TS
1340 CIRCLE ((160+1)*RR,75*RR),20*RR,C,280*TS,30*TS
1350 CIRCLE ((160-21)*RR,85*RR),20*RR,C,330*TS,85*TS
1360 CIRCLE ((160-1)*RR,75*RR),20*RR,C,150*TS,260*TS
1370 CIRCLE ((160-1)*RR,125*RR),20*RR,C,95*TS,210*TS
1380 CIRCLE ((160-21)*RR,115*RR),20*RR,C,280*TS,30*TS
1390 CIRCLE ((160+1)*RR,125*RR),20*RR,C,330*TS,85*TS
1400 CIRCLE ((160+21)*RR,115*RR),20*RR,C,150*TS,260*TS
1410 RETURN

```

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Machine code programs, BASIC programs, *Lucid* files and documents all are saved and retrieved with no protocol—instantly, ready to run.

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Database—The portable disk drive stores your mailing list, inventory items, part #s and descriptions or any other data that you need to recall.

358K on a diskette

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Telecom interface—If you are a user that likes to access other computers or databases (for example CompuServe) by telephone then this powerful facility alone is worth the price of the disk drive. You can automatically download and upload information onto the diskette.

Calendar—Everyone who has seen this program has said, "This is the first calendar/

diary/scheduler on any computer anywhere that I can use. It is so functional."

The calendar program is usable for two reasons, first it is designed correctly, and second you have the memory (358K) on the diskette to log and access a tremendous amount of notes over a long period of time.

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An easy way to expand hard disk capacity

Efficient Allocation of Hard Disk Storage

By Dennis Murray and Horace Ory

At one time the 10 MB hard disk of the Tandy 2000 seemed to offer unlimited space for storing files. But that was a short-lived delusion. The accumulation of files soon filled the disk and frequent attention to redeeming space from non-essential files was required. Generally, the disk space that was occupied by the files considerably exceeded their lengths. Where did all the space go?

8 KB Allocation Units Waste Space

The size of the allocation unit set by MS-DOS for the Tandy 2000 squandered some of it. The allocation unit for the T2K 10 MB hard disk is 16 sectors, or 8 KB, unlike the 4 KB size of the IBM hard disk allocation unit. With small files, most of the 8 KB unit is wasted, and even for large files, up to 8 KB per file can be wasted.

The difference between the space allocated for a file and the actual file size is about 4 KB, on the average, for files that have a uniform distribution of sizes. Many handy utilities and batch files are small, which tends to increase the amount of wasted disk space. Clearly, if smaller allocation units are used, more files can be stored in the same space.

Reclaim Space with Smaller Allocation Units

The situation can be improved. The (Dennis Murray and Horace Ory use their Tandy 2000s in their work for calculations in radar and optics and for general applications. Questions should be directed to Horace Ory, 1752 Thurber Place, Burbank, CA 91501.)

disk parameters set by MS-DOS provide plenty of latitude for changing the size of the allocation unit. Before going into the simple modification for 4 KB units, it's worthwhile to consider the way the disk parameters are specified.

The pertinent parameters can be found in the boot sector of the hard disk. The boot sector begins with a media descriptor byte, followed by a Tandy 2.0 identification. The bytes following that are given in Table 1, along with their values as set by MS-DOS 2.11. Note the values of 10H sectors per allocation unit and 0CH sectors for the file allocation table, or FAT. Of these parameters, only the value for sectors per allocation unit need be changed to obtain 4 KB units. The number of sectors per FAT is more than adequate.

The 12 sectors set aside for the file allocation table are sufficient for allocation of 32 MB of disk storage space in 8 KB units. That is, the FAT is 6 KB long and each entry requires 12 bits (three bytes per two units), so the maximum possible number of entries is 4K. This is also the maximum number of units that can be enumerated using a 12-bit designator; note that $FFFH + 1 = 1000H = 4096D = 4K$.

Disks smaller than 32 MB can thus be allocated in smaller units. There is a limitation. Apparently because shifts are used in calculating locations, the number of bytes in the allocation unit must be an integral power of 2. In effect, then, no more than 16 MB of storage can be allocated using units smaller than 8 KB without changing the size of the FAT to hold more than 4K entries,

Table 1
Hard Disk Boot Sector Parameter Values

Location	Type	Parameter	Original Value
0BH	DW	Bytes per sector	200H
0D	DB	Sectors per allocation unit	10
0E	DW	Reserved sectors	1
10	DB	Number of FATs	2
11	DW	Max root directory entries	200
13	DW	Number of sectors in medium	5148(a)
15	DB	Media descriptor byte	E8
16	DW	Sectors per FAT	0C
18	DW	Sectors per cylinder	11
1A	DW	Number of heads	4(b)
1E	DW	Beginning root directory sector	19
20	DW	Beginning data sector	39

(a) 79EC for the 15 MB hard disk.

(b) 6 for the 15 MB hard disk.

and using more than 12 bits to enumerate the units.

For a 10 MB hard disk, the use of 4 KB allocation units requires 2.5K entries in the FAT, which has the capacity to hold 4K entries. However, if 2 KB units are used, then 5K entries are needed where the table has only 4K capacity. Changing the size of the FAT involves a number of complications, and is unnecessary for the use of 4 KB units. In fact, 4 KB units are relatively easy to implement — it isn't even necessary to reformat the disk.

Of course, the FAT and directory entries must be deleted because they will not be proper references after the size of the allocation unit is changed. The FAT and directory areas must be reinitialized by filling them with zeros. Therefore, although it is not necessary to reformat, a preliminary full backup is needed and the backed up files must be read back to the disk after the change. All planned directories should be made before the files are read back in, which speeds up access to directory files.

Locations of the memory images of the Disk Parameter Blocks are given in Table 2. These images are produced by MS-DOS when the disk boot sectors

Table 2
Locations of Memory Images
of Disk Parameter Blocks

Drive	Location
A	0000:5BC7
B	0000:5BE9
C	0000:5C88
D	0000:5C9B

are read during the cold boot process, so it is not necessary to modify the memory images independently. During the cold boot, the second FAT is also constructed based on the first FAT. These normal boot operations greatly simplify the procedure for changing the size of the allocation unit.

The theoretical maximum saving of disk space through the use of 4 KB allocation units is 50 percent. Based on the first few applications of 4 KB units, about a 15-30 percent reduction in the disk space used by the files can be expected for typical file size distributions. A 20 percent reduction, for example, saves 2 MB of a 10 MB disk. In that case, a 12.5 MB disk with 8 KB units is required to store the files that can be stored on a 10 MB disk with 4 KB units.

This useful expansion of hard disk capacity requires only a change in the number of sectors per allocation unit from 10H to 8H, and reinitialization of the FAT and directory. It is applicable to both internal and external drives; it imposes no constraints or limitations on use of the hard disk. Most of the work is in backing up existing disk files and reading them back in after the modification. The procedure is simple and straightforward.

Procedure for Using 4 KB Allocation Units

1) Make a full backup of the contents of the hard disk. Take the opportunity to do some pruning of files and house-keeping. Also, note the amount of disk space used and free space available so the amount of space saved can be calculated later.

2) Using DEBUG, load the first 50H sectors of the hard disk.

-L DS:0000 2 0 50

The 50H sectors are more than enough to include the boot sector, FAT tables and directory. (For Drive D, use L DS:0000 3 0 50)

3) Change the sectors per allocation unit from 10H to 08H.

-E 000D

xxxx.000D 10.08

(You enter the 08 and press RETURN.)

4) Fill the area from 0203H to 71FFH with zeros to delete the FAT entries and the directory. (The first FAT begins at 0200H, the second FAT begins at 1A00H and the root directory begins at 3200H and extends to 71FFH.)

-F DS:0203 71FF 0

5) Make sure the first FAT begins with the entries FBFFFF at 0200H.

-D DS:0200 0202

If the entries at 0200H are not FBFFFF, then enter them.

-E DS:0200

xxxx:0200 xx.FB xx.FF xx.FF

6) Write the 50H sectors with the changes to the disk.

-W DS:0000 2 0 50

(For Drive D: use W DS:0000 3 0 50)

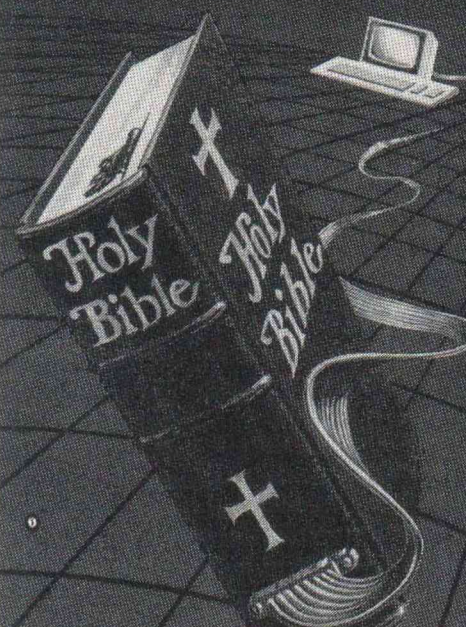
7) Reboot from a floppy disk. At this point the revised boot sector is read into memory and used, and the second FAT is constructed.

8) Still operating from the floppy disk, perform a SYS C: (or SYS D: if appropriate).

9) Read the backup files onto the hard disk again. Log onto the hard disk, note the amount of space used and free space available, then calculate the percentage saved through the use of 4 KB units.

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*Secretly loved and openly ridiculed,
BASIC finds a friend and spokesperson*

In Defense of BASIC

By William Barden, Jr.
PCM Contributing Editor

Several weeks ago, I was driving north to Silicon Valley, Calif. As I drove, I was absentmindedly tuning my car radio, trying to catch an interesting show — something moderately hard to do in a state where most radio discussions center around hot tubs, tofu and transcendental meditation.

"This is Mr. Computer, (hiss) (crackle) our guest today is Bill (crackle) one of the chief suppliers of BASIC software to the computer industry."

This sounds like my cup of tea, I thought. I tried to bring in the station more clearly as I passed a Lamborghini bearing a license plate holder stating "This is my other car." I adjusted the tuning control. Ah, there we were . . .

" . . . and we'll be taking calls from all you computer users out there in radio land. I'm sure you'll have questions to pose to Bill about BASIC and other languages. Let's see, here's our first caller, Bob from Palo Alto . . ."

"Hi, Mr. Computer. I just wanted to ask Bill what he thinks the future of

BASIC is in light of all these powerful new languages that are out."

"Hi, Bob. What powerful new languages? All I see are languages that are simply *different* from BASIC. There aren't any that really offer clear cut advantages over BASIC. There aren't many that are an order of magnitude faster than *compiled* BASIC.

"Let's go down the list. In chronological order, we have FORTRAN, COBOL, BASIC, PASCAL, FORTH and C to name a few of the most popular ones. We'll forget about the dozens of other "mainframe" or less popular languages such as LISP, ALGOL, PL/I, ADA, APL and so forth.

"FORTRAN was one of the first high-level languages and was used for engineering and scientific work. It's an anachronism now, even though it still has a large following made up mostly of engineers and scientific programmers educated in the sixties who are reluctant to change, and who influence the choice of languages in their departments. As soon as they retire, so will FORTRAN.

"COBOL was originally developed as an English-like language that could be used by managers so they could dispense with those surly, anti-social programmers that caused so much trouble in software schedule slips. COBOL is still very popular in large mainframe business data processing environments. It's a good language for

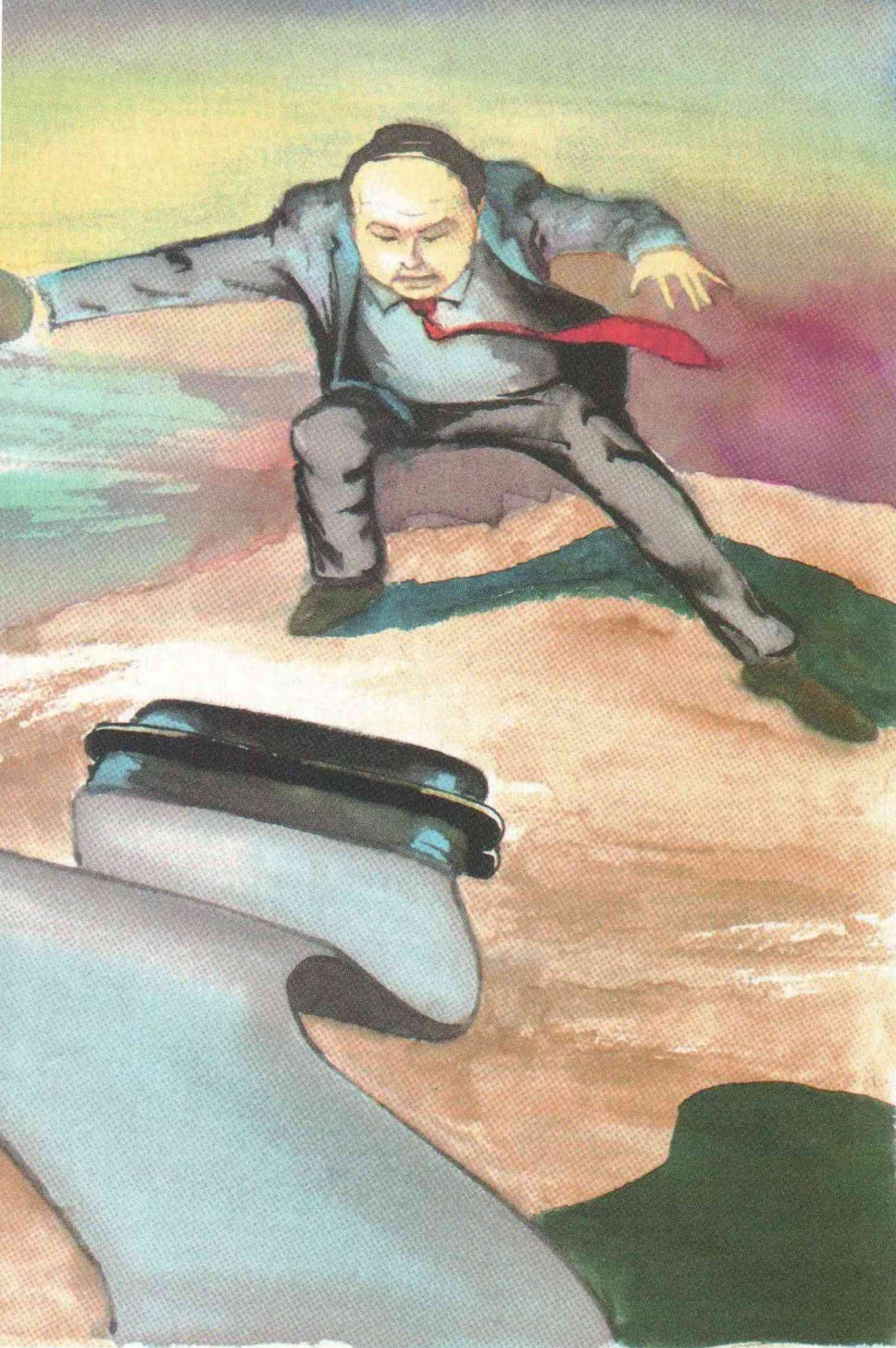
large business applications, but not very good for microcomputer work.

"PASCAL is very structured, or so they claim in the cloistered halls of academia. It comes as a shock to a new computer student conversant in BASIC that the PASCAL structure is awkward to use, inverted from the 'top-down' design advocated — 'procedures' or subroutines must come *first* in the program.

"FORTH, it's true, is a completely different approach to a language, using 'Reverse Polish Notation' similar to that used on some scientific calculators, and a 'stack' orientation. New users must become Zen Buddhists and sign a statement never to use other languages again.

(William Barden, Jr. is a master communicator in a field in which he is one of the few recognized experts — microcomputers. A prolific author of 30 books and handbooks on computers and computer programming, Bill also has authored several instructional software projects for Tandy/Radio Shack.)





"I'll have to admit that C is one of my favorite languages, though. It's structured like PASCAL and fairly fast. Still, it's really old wine in new bottles."

"Let's take the next caller," said the host. "It's Stewart from Sunnyvale."

"Hi, Mr. Computer. I'd like to ask your guest what *advantages* he thinks BASIC offers over other languages."

"Good question, Stewart. For one thing, BASIC is available in both interpretive and compiler form. The interpreter is *there* on the system disk of the Tandy 1000, for example, ready to go. Don't discount the efficiency of being able to generate a BASIC program with an interpreter and then compiling the debugged program. It's a great way to

go. With many of the other languages, you must create a 'source' file using an editor, compile the program, check out the compiled code, and then go through the whole cycle again for the next revision. With BASIC, you can simply change a single line in a fraction of the time and you're set to try the next run.

"For another thing, BASIC is the most popular computer language ever implemented. Even though some versions of BASIC are incompatible, there's so much in common between the various implementations of BASIC that a Radio Shack Model III user can pick up a Tandy 1000 BASIC listing and immediately know what's going on.

"For a third point, the new versions

of BASIC have a *lot* of features crammed in. Take the Tandy 1000 BASIC, for example. There are BASIC commands to allow *interrupts* from the communications port, keyboard, timer and so forth. There are BASIC commands for all kinds of graphics manipulations, including 'macro' commands such as those to draw shapes and figures. Each new version of BASIC has more useful commands appended to the language, and it's possible to do all kinds of things that other languages can't handle, or handle only with difficulty."

"Good answer, Bill. Our next caller is Harold from San Francisco."

"Bill, you (beep beep beep). I resent your inference that all FORTH users are unstable creeps. You can take your (beep) BASIC and (beep beep beep beep beep). Have a nice day!"

"Ah, sorry, Bill. Sometimes those calls get through."

"That's OK, Mr. Computer. Folks get pretty biased about their cars, kids and computer languages."

As I drove on, my thoughts turned away from the radio program and towards BASIC on the Tandy 1000, 1200 and 2000. How right the talk show guest was, I thought. BASIC on the MS-DOS systems is extremely powerful and offers a lot of advantages over other languages. Perhaps I should explore BASIC with a PCM article. I could start out with . . .

A Core Set of BASIC Commands

If you've never programmed before, opening up the BASIC manual on your Tandy system is frightening. By actual count, there are over 200 separate BASIC commands, ranging from the very simple, such as END, which ends a BASIC program, to the very complex, such as DRAW, which allows you to draw an entire shape on the screen. What's a reasonable way to learn these commands, or is it reasonable to expect to learn them?

Learning BASIC is like learning any other foreign language. There are two components involved: learning the "vocabulary" of the language and then learning how to put the vocabulary together into useful phrases, sentences and paragraphs. Here's a suggestion on how to go about it. Table 1 lists all of the 219 BASIC commands for the Tandy 1000, 1200 and 2000. Twenty-nine commands are not present on all systems. For the remaining commands, however, all but 21 work exactly the same on all three systems. The 21 commands differ very slightly between systems — the PLAY command on the 1000, for example, allows you to specify a volume for music and up to three "voices," otherwise, it's identical to the PLAY on the 1200 and 2000.

To learn BASIC on your own, start out with a "core" set of BASIC commands, shown in Table 2. These represent the most rudimentary 45 (or so) commands that can be used to accomplish useful things. Using these commands, it is possible to construct BASIC programs to do such things as reading in a list of grades, finding the average of the grades and drawing a simple histogram, as shown in Listing 1 and Figure 1.

The commands in the core set are well documented in many books on BASIC and the "syntax," or format of the commands, is uncomplicated. You can work with the Tandy BASIC manual for your system in using these commands or use the manual in conjunction with other books on BASIC as well. I would very much recommend a book that is geared to IBM PC BASIC or PCjr BASIC, however. Tandy 1000/1200 BASIC is virtually identical to IBM PC BASIC and Tandy 2000 BASIC is very close. Here are some commonly available books that I would recommend:

- *Learning BASIC for the Tandy 1000/2000*, David Lien, Radio Shack 25-1505, \$19.95. The up-to-date revision of a BASIC manual

for the Radio Shack Model I, essentially. Fair, and the only game in town.

- *IBM PC User's Reference Manual*, Gilbert Held, Hayden, \$19.95. Excellent for Tandy 1200 (PC compatible).
- *Microsoft BASIC*, Ken Knecht, Dilithium Press, \$15.95. Good discussion of *Microsoft BASIC* in general, applicable to all three systems.
- *Learning BASIC Fast*, Revised Edition, Claude J. De Rossi, Reston, \$14.95. Generic BASIC, but applicable to all three systems.
- *Tandy 1000 BASIC Reference Manual*, Radio Shack 25-1502.

Not a tutorial, but not bad.

- *Tandy 1200 BASIC Reference Manual*, Radio Shack 25-3130. I use the IBM PC Manual in lieu of this. Fair.
- *Tandy 2000 BASIC Reference Manual*, Radio Shack 26-5130. Because of the incompatibilities between the 2000 and the PC/1000/1200, this is a necessity. Fair.

Using the Core Set of Commands

How do you start using the commands? Very simply. Just turn on the system, load BASIC, type BASIC, followed by ENTER, after the > prompt in MS-DOS) and start using them. It doesn't really matter what you do at this

Table 1. BASIC Commands for the Tandy 1000, 1200 and 2000

ABS Function	ERDEV\$ Variable (not on 2000)
ASC Function	ERL Variable
ATN Function	ERR Variable
AUTO Command	ERROR Statement
BEEP Statement	EXP Function
BLOAD Command	FIELD Statement
BSAVE Command	FILES Command
CALL Statement	FIX Function
CALLS Statement (not on 2000)	FOR...TO...STEP Statement
CDBL Function	FRE Function
CHAIN Statement	GET Statement (files)
CHDIR Command (not on 2000)	GET Statement (graphics) *
CHR\$ Function	GOSUB Statement
CINT Function	GOTO Statement
CIRCLE Statement *	HEX\$ Function
CLEAR Command *	IF...THEN, IF...THEN...ELSE Statements
CLOSE Statement	INKEY\$ Variable
CLS Statement	INP Statement
COLOR Statement	INPUT Statement
COM ON/OFF/STOP Statement	INPUT# Statement
COMMON Statement	INPUT\$ Function
CONT Statement	INSTR Function
COS Function	INT Function
CSNG Function	IOCTL Statement (not on 2000)
CSRLIN Function	IOCTL\$ Function (not on 2000)
CVD Function	KEY ON/OFF/LIST Statement
CVI Function	KEY(n) ON/OFF/STOP Statement *
CVS Function	KILL Command
DATA Statement	LEFT\$ Function
DATE\$ Statement	LEN Function
DEF FN Statement	LET Statement
DEF SEG Statement	LINE INPUT Statement
DEF USR Statement	LINE INPUT# Statement
DEFDBL Statement	LINE Statement
DEFINT Statement	LIST Command
DEFSNG Statement	LLIST Command
DEFSTR Statement	LOAD Command
DELETE Command	LOC Function *
DIM Statement	LOCATE Statement
DRAW Statement	LOF Function *
EDIT Command	LOG Function
END Statement	LPOS Function
ENVIRON Statement (not on 2000)	LPRINT Statement
ENVIRON\$ Function (not on 2000)	LPRINT USING Statement
EOF Function *	LSET Statement
ERASE Statement	MERGE Command
ERDEV Variable (not on 2000)	MID\$ Statement
	MKD\$ Function
	MKDIR Command (not on 2000)

point. Nothing you can do in BASIC will hurt the system. Use a disk you can afford to lose if you'll be using disk commands.

The advantage of the built-in "interpretive" BASIC is that there's almost no lag time between trying to run a 10-line BASIC program and modifying the program when it doesn't work — simply use the screen editor to change the BASIC statements, delete lines by entering the line number alone, and add new lines by entering line numbers that are intermediate in number between existing lines. This process is enormously faster than most other languages that use *compilers*, such as C. It takes a fraction of a second to get to the editor in BASIC (it's

built in), but many seconds to get to the editor in other languages, and a subsequent "recompilation" (changing the statements into code that can then be executed). When multiplied by the thousands of times you'll have to correct and retry BASIC code, this makes interpretive BASIC much more efficient to learn than any other language on MS-DOS systems.

This first step in BASIC is the hardest. It may take you several weeks to get to feel comfortable with these 45 commands. Perhaps you simply *won't* be able to grasp the concepts or to understand what's going on. This is no sin, as we all have aptitudes for different skills. Count your blessings that you may

never be a wild-eyed computer programmer who is up until 2 a.m. putting the finishing touches on his latest creation!

The next step is to move on to a second set of about 60 BASIC commands, indicated in Table 3. These are commands which are found in many BASIC implementations and which are another level of complexity above the core set. If you've learned the core set fairly well and understand the concepts, you should not have a great deal of trouble in learning these commands. However, they will take *time* to learn. Plan on certainly dozens of hours to become familiar with the commands. Again, using the books above, or other books you might have selected will ease the learning process.

At this point, you have probably invested 40 hours or more in learning BASIC and have a pretty good idea whether you have the aptitude for computer programming. The next step is to move on to the third set of about 88 BASIC commands, shown in Table 4. Unfortunately, the commands don't get easier from this point. Many of the commands in the third set are not very complex by themselves, but they are concerned with special systems functions, such as screen graphics, random disk files, data communications, BASIC error trapping and disk subdirectories. Each of these areas requires additional research and learning time. For example, screen graphics would involve learning how the video memory is laid out in the 1000, 1200 and 2000, what graphics modes are available and how to set them, and how to draw and color shapes. These are not profound subjects, but do require time to learn. On the positive side, however, you can simply defer learning some of the areas in which you are not interested until you actually have to use them. To become fairly well acquainted with all of the commands in the third group would require perhaps another 100 hours or so, considering the research you'd have to do into such sticky areas as data communications.

Now that You Know the Commands

Knowing the BASIC commands is not enough to put together large BASIC programs. Of equal importance is knowing how to put them together into usable BASIC programs. One point that should be made clear from the start is that, in general, programming is slow, painstaking work. One does not simply "throw together" a BASIC, PASCAL or

MKI\$ Function
MK\$ Function
MOTOR Statement
NAME Command
NEW Command
NEXT Statement
NOISE Statement (not on 1200 or 2000)
OCT\$ Function
ON COM Statement *
ON ERROR GOTO Statement
ON GOSUB Statement
ON GOTO Statement
ON KEY Statement *
ON PEN Statement (not on 2000)
ON PLAY Statement (not on 2000)
ON STRIG Statement *
ON TIMER Statement (not on 2000)
OPEN "COM" Statement
OPEN Statement
OPTION BASE Statement
OUT Statement
PAINT Statement *
PALETTE Statement (not on 1200)
PALETTE USING Statement (not on 1200)
PCOPY Statement (not on 1200 or 2000)
PEEK Function
PEN Function (not on 2000)
PEN ON/OFF/STOP Statement (not on 2000)
PLAY ON/OFF/STOP Statement (not on 2000)
PLAY Statement *
PMAP Function (not on 2000)
POINT Function
POKE Statement
POS Function
PRESET Statement *
PRINT Statement
PRINT USING Statement
PRINT# Statement
PRINT# USING Statement
PSET Statement *
PUT Statement (files) *
PUT Statement (graphics)
RANDOMIZE Statement
READ Statement
REM Statement
RENUM Command
RESET Command

RESTORE Statement
RESUME Statement
RETURN Statement
RIGHT\$ Function
RMDIR Command (not on 2000)
RND Function
RSET Statement
RUN Command
SAVE Command
SCREEN Function
SCREEN Statement *
SGN Function
SHELL Statement (not on 2000)
SIN Function
SOUND Statement *
SPACE\$ Function
SPC Function
SQR Function
STICK Function *
STOP Statement
STR\$ Function
STRIG Function *
STRIG ON/OFF/STOP Statement
STRING\$ Function
SWAP Statement
SYSTEM Command
TAB Function
TAN Function
TERM Statement
TIME\$ Statement
TIMER Function (not on 2000) *
TIMER ON/OFF/STOP Statement (not on 2000)
TROFF Command
TRON Command
USR Statement
VAL Function
VARPTR Function *
VARPTR\$ Function
VIEW Statement (not on 2000)
VIEW PRINT (not on 1200 or 2000)
WAIT Statement
WHILE . . . WEND Statement
WIDTH Statement *
WINDOW Statement (not on 2000)
WRITE Statement
WRITE# Statement

* Slight differences between the three systems.

Figure 1. Simple Program Results

Student Grade Program

Next Grade or -1 if Done? 100
Next Grade or -1 if Done? 55
Next Grade or -1 if Done? 60
Next Grade or -1 if Done? 77
Next Grade or -1 if Done? 68

.
.
.
Next Grade or -1 if Done? 78
Next Grade or -1 if Done? 75
Next Grade or -1 if Done? 76
Next Grade or -1 if Done? -1

Student Grades Follow:

Number	Grade
1	100
2	90
3	85
4	80
.	.
.	.
14	64
15	60
16	55

Average is 75

Histogram Follows:

Grade of 100 to 96	:	*
Grade of 95 to 91	:	
Grade of 90 to 86	:	*
Grade of 85 to 81	:	*
Grade of 80 to 76	:	*
Grade of 75 to 71	:	*****
Grade of 70 to 66	:	*
Grade of 65 to 61	:	**
Grade of 60 to 56	:	**
Grade of 55 to 51	:	*
Grade of 50 to 46	:	
Grade of 45 to 41	:	
Grade of 40 to 36	:	
Grade of 35 to 31	:	
Grade of 30 to 26	:	
Grade of 25 to 21	:	
Grade of 20 to 16	:	
Grade of 15 to 11	:	
Grade of 10 to 6	:	
Grade of 5 to 1	:	
Grade of 0	:	
Ok		

Listing 1. Program Using Core Commands

```

100 REM *****
110 REM Program to Read in Student Grades, Find the Average,
120 REM and Print Out a Histogram of the Grades.
130 REM *****
140 REM Set up two arrays
150 DIM HIST(20), GRADE(100)
160 CLS: NUM = 1
170 REM Print title
180 PRINT: PRINT: PRINT
190 PRINT "****Student Grade Program****"
200 PRINT: PRINT
210 REM Read in grades from keyboard
220 INPUT "Next Grade or -1 if Done"; GRADE (NUM)
230 IF GRADE(NUM) = -1 THEN 290
240 TOTAL = TOTAL + GRADE(NUM)
250 INDEX = INT(GRADE(NUM)/5)
260 HIST(INDEX)=HIST(INDEX) + 1
270 NUM = NUM + 1
280 GOTO 220
290 REM Now sort grades
300 SWITCH = 0
310 FOR I = 1 TO NUM - 2
320 IF GRADE(I+1) <= GRADE(I) THEN 350
330 TEMP = GRADE(I): GRADE(I) = GRADE(I+1): GRADE(I+1) = TEMP
340 SWITCH = 1
350 NEXT I
360 IF SWITCH <> 0 THEN 300
370 PRINT
380 PRINT "Student Grades Follow:"
390 REM Print all input grades to confirm
400 PRINT "Number Grade"
410 PRINT "-----"
420 FOR I = 1 TO NUM - 1
430 PRINT I, GRADE(I)
440 NEXT I
450 REM Now print average of all grades
460 PRINT: PRINT
470 PRINT "Average is "; TOTAL / (NUM - 1)
480 PRINT
490 REM Now print histogram in 5 point units
500 PRINT "Histogram Follows:"
510 PRINT "-----"
520 FOR I = 20 TO 1 STEP -1
530 PRINT "Grade of"; I*5; "to"; (I*5)-4 TAB(20) ": "; STRING$(HIST(I),"*")
540 NEXT I
550 PRINT "Grade of 0" TAB(20) ": ";STRING$(HIST(1),"*")
560 END

```

Table 2. Core Set of BASIC Commands

ABS Function
ATN Function
CLS Statement
CONT Statement
COS Function
DATA Statement
DIM Statement
END Statement
EXP Function
FOR...TO...STEP Statement
GOSUB Statement
GOTO Statement
IF...THEN, IF...THEN...ELSE Statements
INPUT Statement
INT Function
LEFT\$ Function
LEN Function
LIST Command
LLIST Command
LOAD Command

LOG Function
LPRINT Statement
MID\$ Statement
NEW Command
NEXT Statement
POS Function
PRINT Statement
RANDOMIZE Statement
READ Statement
REM Statement
RENUM Command
RESTORE Statement
RETURN Statement
RIGHT\$ Function
RND Function
RUN Command
SAVE Command
SGN Function
SIN Function
SQR Function
STOP Statement
STRING\$ Function
SYSTEM Command
TAB Function
TAN Function

assembly language program, even though some programmers are fond of telling you how simple a project is. (Programming genius and a penchant for details such as program documentation doesn't often appear together.)

In the best case, once you've become a competent BASIC programmer and done a reasonable number of programs, it may take you anywhere from dozens to hundreds of hours to put together a BASIC applications program. A good example might be *PC-Talk*, the popular data communications program that runs on the IBM PC and compatibles. (*PC-Talk* was originally written by Andrew Fluegelman and was a "Free-ware" program — you received a copy from a friend and then made a contribution if you liked it.) *PC-Talk* does the whole data communications bit — it dials numbers via a Hayes-compatible modem, offers split screen display and "downloads" and "uploads" files. The program runs in compiled BASIC, but is available in interpretive BASIC. The interpretive BASIC program consists of about 800 lines, with the lines averaging about 60 characters each. I'll take a guess and say that this useful, sophisticated program took about half a man-year (1,000 hours) to program and

check out! Be prepared to invest some time in programming.

Program Structure and Design

One of the severest criticisms of BASIC has been not in the time that it takes to develop programs, strangely enough, but in the structure and *maintenance* of programs after they have been written. Since the BASIC interpreters on systems such as the Tandy 1000, 1200 and 2000 are so interactive, and since it's so easy to add on code in a piecemeal fashion, the result is sometimes called "spaghetti code." Figure 2 shows what I mean. It shows the path a typical spaghetti code BASIC program follows during execution. Spaghetti code is extremely hard to follow and difficult to maintain. Suppose that you've written a program to update your inventory and print invoices. Several months later you decide to add an automatic shipping label print capability. If your program structure is not straightforward, and you have a spaghetti code program, it may be difficult for you and impossible for someone else to make the necessary modifications to the program.

The culprit in spaghetti code is the BASIC GOTO statement, which al-

lows a program to jump around along a spaghetti path. One of the reasons PASCAL is emphasized so much in schools is that it does not allow GOTOS and makes for easy-to-decipher programs. All program code must be modular and follow from top to bottom in sequence. Within the program, *loops* are allowed, but not the type of spaghetti coding shown above.

Is it possible to write BASIC programs that are structured? Thanks to the MS-DOS versions of BASIC, it becomes more feasible. For one thing, BASIC now allows any number of preceding blanks so that portions of code can be indented. (Previous BASIC versions discarded blanks, deleting indentations.) Also, BASIC now implements a statement called DO ... WHILE, which makes PASCAL-like code possible. Another great feature for program "self-documentation" is that variable names can be up to 40 characters long in many PC compatible systems — ACCOUNT 5.TOTAL is much more descriptive than the A1 or ACCTS allowed in earlier versions of BASIC.

Along with learning the BASIC commands, you should also learn good program design and structure. Some of the most elementary rules to follow are these:

- Write a design specification on the program before you start coding.
- Spend a great deal of time in the design phase, thinking about the approaches you will take in implementing your program.
- Flowchart your program, or write down a step-by-step approach to how it will be implemented.
- Break your program into "modules" — subroutines or sections of code that accomplish a specific function, such as reading data, searching a list or computing an answer. Make these modules call other lower-level modules that perform more and more general functions. Each module should have only one exit point.
- Heavily document your program by using REM lines, as shown in Figure 3, or by putting remarks at the end of lines with a single quote remark.

Program Development

Typical program development with BASIC goes something like this: You first recognize a need for a program to, say, update an inventory, print out invoices and print shipping labels in your own custom format. A design

Table 3. Second Level BASIC Commands

ASC Function
 AUTO Command
 BEEP Statement
 CDBL Function
 CHAIN Statement
 CHR\$ Function
 CINT Function
 CLOSE Statement
 CSNG Function
 CSRLIN Function
 DATE\$ Statement
 DEF FN Statement
 DEFDBL Statement
 DEFINT Statement
 DEFSNG Statement
 DEFSTR Statement
 DELETE Command
 EDIT Command
 EOF Function *
 ERASE Statement
 FILES Command
 FIX Function
 FRE Function
 INKEY\$ Variable
 INP Statement
 INPUT# Statement
 INPUT\$ Function
 INSTR Function
 KEY ON/OFF/LIST

KEY(n) ON/OFF/STOP Statement *

KILL Command
 LINE INPUT Statement
 LINE INPUT# Statement
 LINE Statement
 LOC Function *
 LOCATE Statement
 LOF Function *
 LPOS Function
 LPRINT USING Statement
 MERGE Command
 NAME Command
 OPEN Statement
 OPTION BASE Statement
 PRINT USING Statement
 PRINT# Statement
 PRINT# USING Statement
 RESET Command
 SPACE\$ Function
 SPC Function
 STR\$ Function
 SWAP Statement
 TIME\$ Statement
 TIMER Function (not on 2000) *
 TROFF Command
 TRON Command
 VAL Function
 WHILE ... WEND Statement
 WIDTH Statement *
 WRITE Statement
 WRITE# Statement

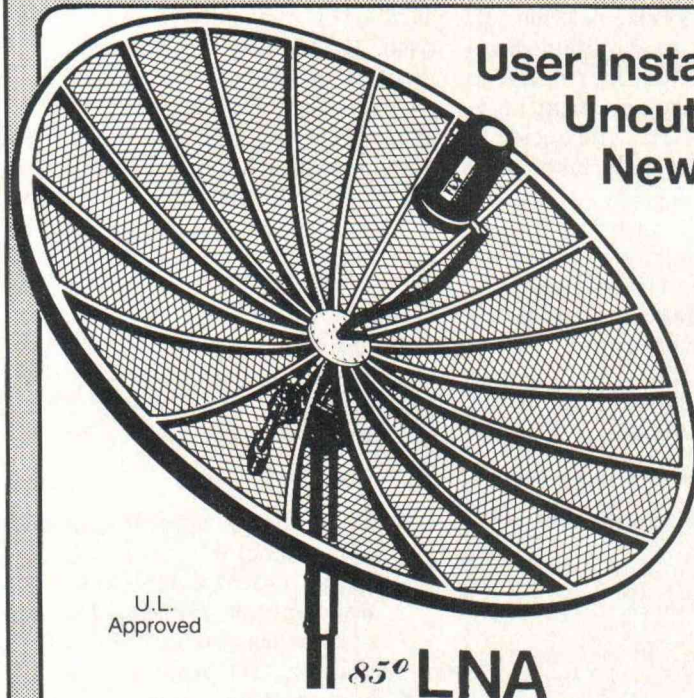
* Slight differences between the three systems.

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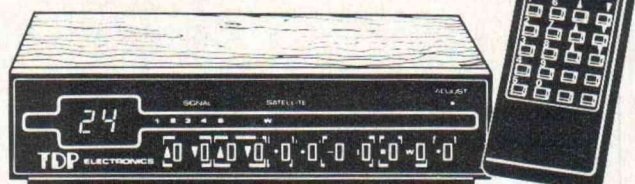
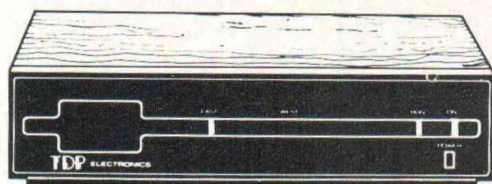
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Next, a flow chart is made for the program breaking the program down into modules. The flow chart shows the logical flow of the program — it's a schematic representation of the code to follow. See Figure 4.

After the program has been coded, it is "debugged" (tested for errors). As an alternative to debugging the entire program, parts of the program may be tested individually before all of the program is coded. Believe it or not, debugging takes as much or more time as the preceding steps. For one reason, programs are complex, containing many permutations of conditions. In

Debugging not only involves looking for errors, but extensive checking with large amounts of test data. In some cases, separate programs might be written to generate test data!

After all bugs have been found and squashed, final documentation for the

**WHERE DO THESE
GOTOS GO?
DO THEY COME BACK?**

[illegible]

- BEEP Statement
- BLOAD Command
- BSAVE Command
- CALL Statement
- CALLS Statement (not on 2000)
- CHDIR Command (not on 2000)
- CIRCLE Statement *
- CLEAR Command *
- COLOR Statement
- COM ON/OFF/STOP Statement
- COMMON Statement
- CVD Function
- CVI Function
- CVS Function
- DEF SEG Statement
- DEF USR Statement
- DRAW Statement
- ENVIRON Statement (not on 2000)
- ENVIRON\$ Function (not on 2000)
- ERDEV Variable (not on 2000)
- ERDEV\$ Variable (not on 2000)
- ERL Variable
- ERR Variable
- ERROR Statement
- FIELD Statement
- GET Statement (files)
- GET Statement (graphics) *
- HEX\$ Function
- IOCTL Statement (not on 2000)

- IOCTL\$ Function (not on 2000)
- KEY(*n*) ON/OFF/STOP Statement *
- LET Statement
- LSET Statement
- MKD\$ Function
- MKDIR Command (not on 2000)
- MKI\$ Function
- MKS\$ Function
- MOTOR Statement
- NOISE Statement (not on 1200 or 2000)
- OCT\$ Function
- ON COM Statement *
- ON ERROR GOTO Statement
- ON GOSUB Statement
- ON GOTO Statement
- ON KEY Statement *
- ON PEN Statement (not on 2000)
- ON PLAY Statement (not on 2000)
- ON STRIG Statement *
- ON TIMER Statement (not on 2000)
- OPEN "COM" Statement
- OUT Statement
- PAINT Statement *
- PALETTE Statement (not on 1200)
- PALETTE USING Statement (not on 1200)
- PCOPY Statement (not on 1200 or 2000)
- PEEK Function
- PEN Function (not on 2000)
- PEN ON/OFF/STOP Statement (not on 2000)
- PLAY ON/OFF/STOP Statement (not on 2000)
- PLAY Statement *

- PMAP Function (not on 2000)
- POINT Function
- POKE Statement
- POS Function
- PRESET Statement *
- PSET Statement *
- PUT Statement (graphics)
- RESUME Statement
- RMDIR Command (not on 2000)
- RSET Statement
- RUN Command
- SCREEN Function
- SCREEN Statement *
- SHELL Statement (not on 2000)
- SOUND Statement *
- STICK Function *
- STRIG Function *
- STRIG ON/OFF/STOP Statement
- SYSTEM Command
- TERM Statement
- TIMER ON/OFF/STOP Statement (not on 2000)
- USR Statement
- VARPTR Function *
- VARPTR\$ Function
- VIEW Statement (not on 2000)
- VIEW PRINT (not on 1200 or 2000)
- WAIT
- WINDOW Statement (not on 2000)

* Slight differences between the three systems.

program is prepared. This documentation would include current listings and specifications for the program along with samples of output and input results.

At some point within the development process, the *interpreted* BASIC form of the program probably becomes a *compiled* BASIC form, primarily to speed up the program. For the most part, this involves simply taking the file for the BASIC program and running it through a BASIC compiler. There are some BASIC command "glitches" for the compiler — BASIC commands that do not operate quite the same way as in the interpreter; but these are not severe and can be corrected easily. The compiled BASIC program will run perhaps dozens of times faster than the interpreted version. Developing the program in interpretive BASIC provides quick, interactive editing and debugging, while compiling the BASIC program optimizes the code, speeding it up greatly.

Yes, those points would make an interesting article, one that might possibly bury some myths about BASIC. . . My attention came back to the radio talk show, which was fading in and out as I drove.

"Our next caller is Jennifer. Jennifer, do you have a question for Bill?"

"Hi, Mr. Computer. Yes, I'd like to ask Bill what he thinks are the most powerful features of BASIC found on the Tandy 1000, 1200 and 2000."

"Good question, Jennifer. There are so many features that BASIC offers. Let me just list some features that you might find interesting.

"It's possible to play three voices — three notes — simultaneously from BASIC on the 1000, varying the pitch, volume, note length and so forth. Pretty neat, I think.

"Using the VIEW and WINDOW statements on the 1000, you can display

Figure 3. Using Remark Lines

```
10000 *****
10010 'Subroutine to Print Reference Cards on 8 1/2" by 11" Paper
10020 *****
10030 PRINT "ALIGN PAPER AT TOP OF FORM AND PRESS ANY KEY"
10040 A$=INKEY$: IF A$="" THEN 10040 'Loop until keypress
10050 LPRINT STRING$(4,13) 'Skip four lines
10060 WIDTH "lpt1:",255 'Avoid auto new line
10070 LPRINT CHR$(27);CHR$(20) 'Set condensed type
10080 WHILE I<=TBLEN 'Do entire table
10090 'Now print three cards across paper
10100 LPRINT TAB(1) STRING$(23-(LEN(NAM$(I,1)))/2,"")+NAM$(I,1);
10110 LPRINT TAB(47) STRING$(23-(LEN(NAM$(I+1,1)))/2,"")+NAM$(I+1,1);
10120 'Now 10 new lines to properly space for six cards vertically
10130 LPRINT STRING$(10,13)
10140 I=I+3 'Just did three entries
10150 WEND
10160 PRINT "NOW PUT IN BACK SIDE OF PAPER AND PRESS ANY KEY"
10170 A$=INKEY$: IF A$="" THEN 10170 'Loop until keypress
10180 LPRINT STRING$(4,13) 'Skip four lines
10190 I=0 'Initialize index
10200 WHILE I<=TBLEN 'Do entire table
10210 'Now print in reverse across backside of paper
10220 LPRINT TAB(1) STRING$(23-LEN(NAM$(I+2,2))/2,"")+NAM$(I+2,2);
10230 LPRINT TAB(47) STRING$(23-LEN(NAM$(I+1,2))/2,"")+NAM$(I+1,2);
10240 LPRINT TAB(94) STRING$(23-LEN(NAM$(I,2))/2,"")+NAM$(I,2);
10250 LPRINT STRING$(10,13)
10260 I=I+3 'Just did three entries
10270 WEND
10280 RETURN 'End of subroutine
```

windows on the screen and work in real-world coordinates — no need to convert to screen coordinates any longer.

"Using the interrupt features from inside BASIC you can automatically interrupt a BASIC program as a data communications character comes in, after an elapsed time or when a joystick button is pushed. This provides a feature not found on a lot of other BASICs.

"There are BASIC commands to create and manipulate directories and subdirectories on disk. This means that you can have an unlimited number of disk files and can handle them from within BASIC.

"The DRAW graphics command has been expanded so that you can draw any figure or even define character sets from BASIC, and then scale the figure up and down, rotate it and do other ma-

nipulations with it. The GET and PUT statements allow you to define shapes and automatically place them anywhere on the screen.

"Every time a new version of BASIC is released, more features are added — as a slight example, the RESTORE statement now allows you to reset a DATA list at any point and not just to the beginning.

"I could go on and on."

"We've got time for one more call, Bill. Blinky, you're on (hiss) the air with Mr. Computer and Bill (crackle)."

"Hi, Mr. Computer. Hi, Bill. Just one question. Bill, I get the impression that your company is the one responsible for upgrading BASIC — for new releases of BASIC that have more and more powerful features. I suspect if it were left up to the companies, they wouldn't give a darn. Is that the way it is?"

"Well, Blinky, (crackle) wouldn't say that most computer companies are that innovative. (hiss) IBM, for example, (crackle) Tandy, on the other hand, (crackle) (hiss)."

Unfortunately, I missed the reply. It would have been interesting to have known who was responsible for all of the neat features of 1000, 1200 and 2000 BASIC, especially 1000 BASIC. As I drove on toward Silicon Valley, the talk show faded into static. I had second thoughts about the column. Could I really convince people that today's MS-DOS BASIC was worth taking a look at over other languages? I wondered . . . □

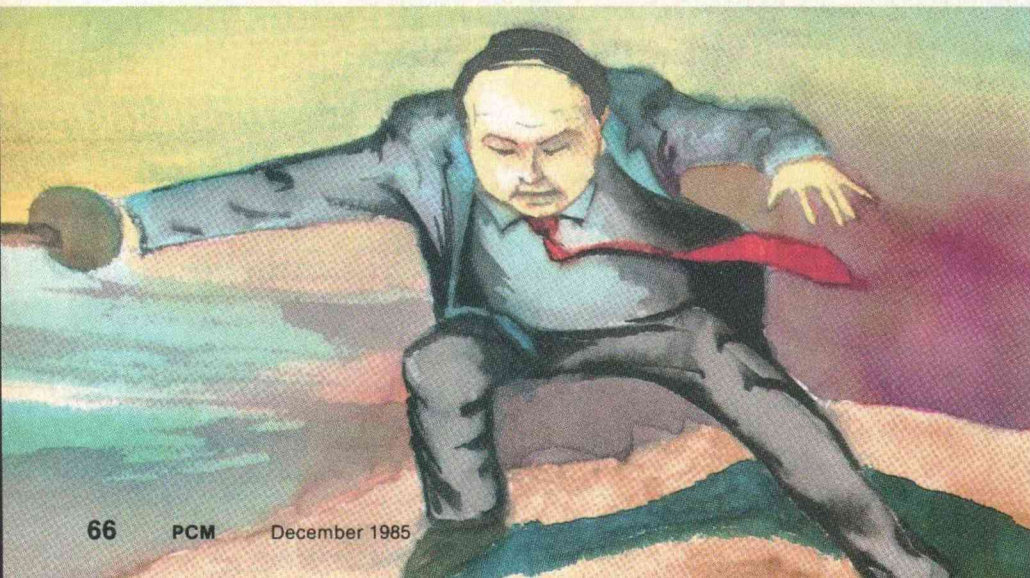
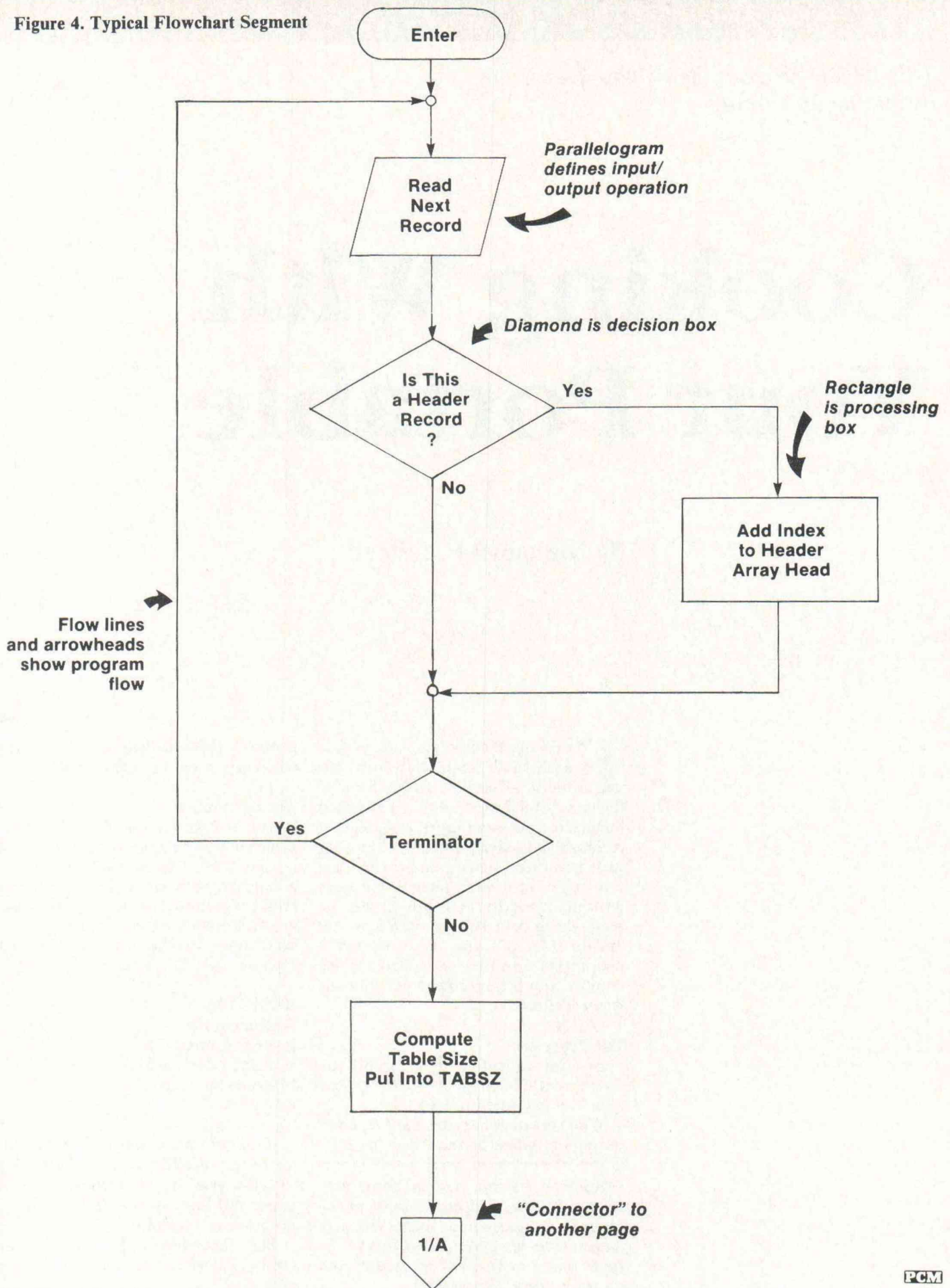


Figure 4. Typical Flowchart Segment



This BASIC program helps you keep your recipe file up-to-date

Cooking With Your Portable

By Nathaniel F. Ireland

Every good cook has a recipe file, and usually it is a 3 by 5-inch card file in a file box. In the back of the box, behind the cards, may be found magazine and newspaper clippings of recipes that looked good at the time but were never recorded on cards. There are also copies of friends' recipes that were written hurriedly and can hardly be read. Using your 100, a suitable printer and LPTREC.BA, you too can have a neat recipe card file and can give a nice copy of your prize recipe to your friends when they ask.

The Program

For instructions on creating the recipe text file, load LPTREC.BA and type RUN 920 and press ENTER.

When creating a recipe text file, enter the recipe name at the "File to Edit"

(Nathaniel Ireland, now a retired gentleman farmer, was an engineer in the electronics industry for many years. In addition to his agricultural hobby, he finds time to enjoy his computers and do some consulting work.)

prompt. This will help identify the file when it is saved to tape or disk.

The Subroutine

You will notice that Line 30 directs program flow to a subroutine that starts at Line 5200. This subroutine performs a function similar to the FILES command except it selects which type of files are listed on the screen. The file type is determined by the number before the THEN in Line 5235 and are as follows:

BASIC file	= 128
Document file	= 192
Protected BASIC file	= 105
Protected document file	= 200
Machine language file	= 160
Killed file	= 0

If the subroutine finds more than one file of the specified type, you are asked to select one. If only one is found, its name will flash on the screen and the program will continue.

This subroutine can be saved using Option A and can be merged into other programs. □

The listing:

```

10 MAXFILES=1:CR$=CHR$(13):SP$=" ":WD$="
":LC=1:M=0:W=45:LS=1
20 REM * LPTREC.BA * by Nathaniel F. Ire
land March 1984
30 GOSUB5210
100 REM INPUT DATA FROM RAM
110 OPEN"RAM:"+F$+" DO"FORINPUTAS1
120 INPUT#1,A$:IFA$<"RECIPE"THEN910
130 INPUT#1,TI$
140 LPRINTSTRING$(22,"-");"cut";STRING$(
22,"-");"+"
150 L=LEN(TI$):LL=INT(L/2):LPRINTTAB(23-
LL)TI$;TAB(47)CHR$(124):LPRINTTAB(47)CHR
$(124)
160 LINEINPUT#1,IG$
170 IFIG$=""THEN230
200 REM LPRINT INGREDIENTS
210 LPRINTIG$;TAB(47)CHR$(124):NI=NI+1
220 IFNI>15THEN1010ELSE160
230 IFNI<15THENFORN=1TO15-NI:LPRINTTAB(4
7)CHR$(124):NEXT
240 LPRINTSTRING$(22,"-");"fold";STRING$(
21,"-");"+"
300 REM LPRINT TEXT
310 IFEOF(1)THEN530
320 A$=INPUT$(1,1)
335 IFA$=CR$THEN400
340 WD$=WD$+A$
350 WL=WL+1
360 IFA$=SP$THEN400ELSE310
400 IFLPOS(0)+WL<=WTHENLPRINTWD$;ELSELPR
INT;TAB(47)CHR$(124):LC=LC+1:GOTO310
410 WD$=""
420 WL=0
430 IFA$=CR$THENGOSUB800
450 IFLC<=18THEN310ELSE1000
530 IFLC=18THEN540ELSEFORN=1TO18-LC:LPR
INTTAB(47)CHR$(124):NEXT
540 LPRINTSTRING$(22,"-");"cut";STRING$(
22,"-");"+":CLOSE:MAXFILES=0:MENU
800 LPRINTTAB(47)CHR$(124)
810 LC=LC+1
820 A$=INPUT$(1,1)
830 IFA$=SP$THEN820
850 RETURN
900 REM WRONG FILE MESSAGE
910 CLS:PRINT"YOU ARE TRYING TO INPUT A
FILE WHICH IS EITHER THE WRONG TYPE OR I
S THE RIGHT TYPE IN A WRONG FORMAT. TO
REVIEW FILE FORMAT PRESS <1> AND ENTER
.";:INPUTWR:IFWR<1THENCLOSE:MAXFILES=0:
MENU
920 CLS:PRINT" * FORMAT FOR RECIPE RAM T
EXTFILE *":PRINT"-RECIPE (TYPE THE WORD,
PRESS <ENTER>).":PRINT"-TITLE (45 CHARS
+SPCS), PRESS <ENTER>." :PRINT"-15 LINES
INGREDIENTS (<ENTER> EACH). "
925 PRINT"-END INGREDIENTS LIST (PRESS <

```

```

ENTER>).":PRINT"-18 LINES OF INSTRUCTION
S TEXT. PRESS <ENTER> AT FINISH."
930 INPUT"PRESS ENTER FOR MENU";ME:CLOSE
:MAXFILES=0:MENU
1000 CLS:PRINT"THERE ARE TOO MANY LINES
IN THE INSTRUCTION TEXT. SHORTEN IT ABIT
AND TRY AGAIN." :END
1010 CLS:PRINT"YOU HAVE TOO MANY LINES O
F INGREDIENTS. TRY PLACING A FEW ON THE
SAME LINE IN THE TEXTFILE AND TRY AGAI
N." :END
5200 REM MERGABLE SUBROUTINE FOR
SEARCHING F9BDH-FA83H FOR USER DOCUMENT
FILES. ROUTINE USES 'Z' VARIABLES AND
STRINGS AND OUTPUT IS F$ AND IS 6 CHAR.
MAX.
5210 CLS
5220 FORZ2=63933TO64131STEP11
5230 FORZ3=0TO10
5235 IFPEEK(Z2-3)<192THEN5300
5240 Z2$=CHR$(PEEK(Z2+Z3))
5260 Z1$=Z1$+Z2$:Z2$=""
5270 NEXTZ3
5280 Z9=Z9+1
5290 PRINTTAB(2+Z4)LEFT$(Z1$,6);:Z8$=Z1$
:Z1$="" :Z4=Z4+10:IFZ4=40THENPRINT:Z4=0
5300 NEXTZ2
5310 IFZ9=1THENF$=LEFT$(Z8$,6):Z8$="" :CL
S:RETURN
5320 PRINT@242,;:LINEINPUT"ENTER FILESPE
C (6 CHAR MAX)";F$
5330 IFLEN(F$)>6ORF$=""THENPRINT@269,"
";:GOTO5320ELSECLS:RETURN

```

Sample Recipe File: GAZSPA.DO

```

RECIPE
BLENDER GAZSPACHO - A COLD SALAD SOUP
1 16 OZ CAN WHOLE PEELED TOMATOES
2 TBLSPN LIQUID CORN OIL
3 TBLSPN VINEGAR
1 TSPN WORCESTERSHIRE SAUCE (LEA & PERRI
NS)
1 MED. ONION, PEELED AND QUARTERED
1/2 TSPN GARLIC SALT (OR PLAIN SALT)
1/4 TSPN GROUND HOT PEPPER
1 CUP CELERY, CUT 1 INCH LONG
1/2 MED. CUCUMBER, PEELED AND CHUNKED
1 MED. FRESH TOMATO, CHUNKED
1 GREEN PEPPER, SEEDED AND CHUNKED

```

Blend first seven ingredients until sm
ooth. Pour into bowl. Place remaining in
gredients in blender. Cover with liquid
from bowl. Course chop in blender (do no
t over-blend). Pour back into bowl and m
ix with spoon. Store overnight in refrig
erater, serve cold.

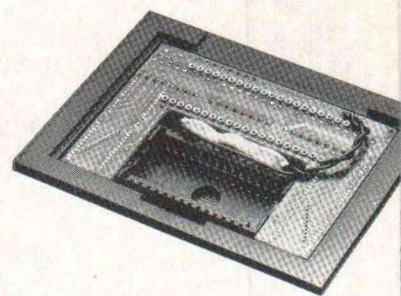
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You push a function key and you are in the second bank. Push again and you are in third, again, then fourth. Press it once again for your original bank.

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What is really great is that you can copy a file from one bank to another with just a function key.

Each bank is like having another Model 100, and all the built-in programs as well as any snap-in ROM programs appear in all four banks and work the same way. Your widebar cursor moves from file to file and you access any file or run any program just by pressing ENTER.

What lets you copy any file from one bank to another is a snap-in ROM from PCSG called RAM+, that comes at no extra charge. It just pushes right into the little socket in that same compartment with the 96K expansion unit.

Not only does this firmware let you copy a file from bank to bank, but you can make a copy of any file within the same bank instantly with a function key. Great for Lucid spreadsheets!

Copy a file from bank to bank with a function key

You can also rename a file, or kill any file with just a function key. Plus you can do a whole lot of other useful things like setting the date, day and time with function key ease. You even have a function key that lets you use non-Radio Shack printers without having to make those tricky dipswitch settings.

RAM+ lets you cold start any one of your banks without affecting the other three. That means that anytime you want you can clean out a bank's entire memory, but leave intact all the files in the other banks.

What is also fantastic is that you don't have to have the ROM in place to use the additional RAM. Whenever you take out the snap-in ROM it leaves behind a tiny machine code program that lets you switch from bank to bank just by pressing ENTER.

This lets you use your ROM socket to snap-in other ROMs like LUCID spreadsheet, WRITE ROM text processor, or DISK+ ROM file transfer program, and use them in any or all four banks. All of these, by the way, are available from PCSG.

When you are ready to copy a file from one bank to another or use any of the other fantastic functions we talked about you can just snap the RAM+ ROM back into place.

Everybody that has this 128K system in their Model 100 is so excited, because it gives them four times the capacity and all banks work just like the Main Menu.

And what has made a lot of people happy is that the system bus, located in the same compartment, is left free for you to plug in a DVI or the Holmes Engineering/PCSG portable disk drive.

The ability to copy a file from bank to bank instantly with a function key, plus all of the other features make this RAM extension truly an engineering masterpiece.

Some people hesitate when they think of installing something, and then others are skeptical that any additional hardware could be as good as the Model 100 itself. That's why we sell these 96K expansions on a 30 day trial. Simply return it within 30 days for a full refund if you are not satisfied. Priced at \$425. MC VISA COD.

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*Your kids save a poor stranded robot
and learn a little about math to boot*

Robomath

By Leonard Hyre

An educational program designed to keep a young child's interest, *Robomath* helps teach basic addition and subtraction skills. By giving the child an exciting and challenging goal (the rescue of "Robo," the friendly robot), the correct answers take on a more important meaning in the student's mind. I have tried to take advantage of the Tandy 1000's color and sound capabilities to give *Robomath* arcade-like action.

The scenario for *Robomath* is simple. Robo is stranded on a strange and desolate planet. Naturally, we all wish to help rescue him from his sad situation. His rescue ship must send down fuel for Robo to be able to blast off. A full tank is the minimum requirement. The student's job is to provide the coordinates needed to properly fill the fuel tank. Answering the math problems correctly provides the rescue ship with needed information. Unfortunately, an incorrect answer will cause the tank to be depleted one unit of fuel.

(Leonard Hyre works as a claims representative for the Social Security Administration. He has written several articles for THE RAINBOW, PCM's sister publication for the Color Computer, and is the author of a number of commercial programs. He may be contacted at P.O. Box 403, Cambridge, MD 21613; 301-228-0064.)

Of course, filling the tank results in a "tractor beam" rescue and a blast off by the space ship.

Student options include addition and subtraction problems and you can easily make changes in the problems to suit the level of skill of your would be space engineer. Just change the 9s in Line 290 to whatever the largest integers you want (less one) used for addition. In Line 400, you can change the 15 and 8 for the same effect on subtraction.

Program Structure

We begin the program with a bit of housekeeping; in other words, we set up a couple of necessary starting values. The DN=175 in Line 150 marks the starting point for the graphics filling of the fuel tank. We then turn off the cursor with LOCATE 1,1,0 and we are ready to get on with the program screen set up. This is handled by the subroutine at Lines 650 through 950. This routine sets up boundaries, draws Robo and the space ship and presents an empty fuel tank. Using DRAW commands, we set up strings to represent the letters 'R', 'O' and 'B' and then execute them with lines 910 through 950. Beginning BASIC programmers might take note of the use of the PALETTE 3,14 (Line 660) which produces a nice bright yellow color to use with the four-color set allowed in screen Mode 1.

At this point, we are ready to start the action, so a jump is made back to the menu screen (Lines 180 through 240) where a choice of saving Robo via addition or subtraction is given.

The separate routines for generating addition or subtraction problems follows. Each routine performs all necessary actions to select a problem and present it, control the answer for appropriate action and continue with the next problem. For example, in the addition routine (Lines 280 through 350), the first action is to go to the subroutine at 1000 which clears the problem display area for the new problem. The numbers are selected and the problem is shown to the child. If the answer is correct, a GOSUB to the "fill fuel cell routine" (Lines 490 through 530) is made; otherwise, the answer must be wrong — jump to the "drain fuel cell" section (Lines 540 through 570). By having these two subroutines, we can use of their actions for both addition and subtraction. The subtraction routine is essentially set up the same as addition and no further discussion is needed for you to be able to follow its logic.

Only one major action remains, the rescue operation. The remaining program lines from Line 1000 through the end of the program control this activity. No user input is needed since the child

has already accomplished his part of the mission. A tractor beam is projected to the surface and Robo is pulled into the ship. Flames roar from the rocket engines as Robo is then whisked away to safety. An opportunity to play again is presented for the finale.

A Final Note

I believe *Robomath* will be a valuable addition to the software collection of those seeking educational programs for the younger set.

For those of you who are reluctant

typists, I am willing to provide a copy of *Robomath* on disk if you will send \$5 to cover media and shipping costs. Send to P.O. Box 403, Cambridge MD 21613. If you have any problems or suggestions concerning the program, I'll be glad to hear from you. □

The listing:

```

10 *****
20 *
30 *      ROBOMATH by L.Hyre      *
40 *
50 *      [C]  9/85              *
60 *
70 *      CAMBRIDGE  MD          *
80 *****
90 '
100 GOSUB 650
110 '
120 *** SET UP PROGRAM START ***
130 '
140 RANDOMIZE TIMER
150 DN=175
160 LOCATE 1,1,0
170 '
180 *** MENU ***
190 '
200 LOCATE 6,20:PRINT"How do YOU":LOCATE 7,20:PRINT"choose  to":LOCATE 8,20:PRIN
T"save ROBO?"
210 LOCATE 9,20:PRINT"1>Add":LOCATE 10,20:PRINT"2>Subtract"
220 CH$=INKEY$:IF CH$=""THEN 220
230 IF VAL(CH$)<1 OR VAL(CH$)>2 THEN 220
240 ON VAL(CH$) GOTO 280,390
250 '

```

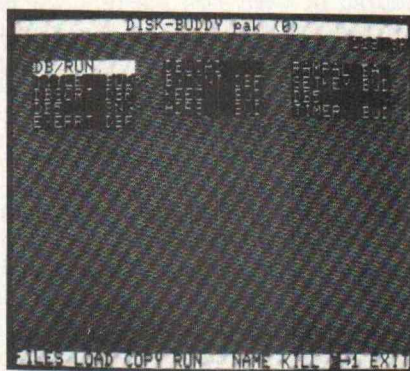
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```

260 '*** ADDITION ***
270 '
280 GOSUB 1000
290 A=INT(RND(1)*9)+1:B=INT(RND(1)*9)+1
300 LOCATE 6,20:PRINT"ADDING..."
310 LOCATE 8,19:PRINT A"+"B"= "
320 LOCATE 9,20:PRINT"?";:LINE INPUT AN$
330 GOSUB 1050
340 IF VAL(AN$)=A+B THEN GOSUB 490 ELSE GOSUB 570
350 GOTO 280
360 '
370 '*** SUBTRACTION ***
380 '
390 GOSUB 1000
400 A=INT(RND(1)*15)+1:B=INT(RND(1)*8)+1:IF B=>A THEN 400
410 LOCATE 6,20:PRINT"SUBTRACT..."
420 LOCATE 8,19:PRINT A"- "B"= "
430 LOCATE 9,20:PRINT"?";:LINE INPUT AN$
440 GOSUB 1050
450 IF VAL(AN$)=A-B THEN GOSUB 490 ELSE GOSUB 570
460 GOTO 390
470 '*** FILL FUEL CELL ***
480 '
490 PAINT(310,DN),2,1
500 PLAY"T255V15L3201C02C03C04C05C"
510 IF DN<=35 THEN 1120
520 DN=DN-20
530 RETURN

```

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```

540 '
550 '*** FUEL CELL DRAIN ***
560 '
570 DN=DN+20:IF DN=>175 THEN DN=175
580 PAINT(310,DN),3,1
590 PLAY"T255V15L3204CO3CO2CO1CCC"
600 RETURN
610 GOTO 610
620 '
630 '*** SET UP SCREEN ***
640 '
650 KEY OFF:LOCATE 1,1,0:SCREEN 1,1
660 PALETTE 3,14
670 CLS
680 LINE(3,5)-(319,199),2,B
690 LINE(7,9)-(120,190),1,B
700 LINE(130,9)-(255,100),2,B
710 PAINT(155,11),1,2
720 LINE(270,7)-(314,190),1,B:PAINT(290,12),3,1
730 FOR L=20 TO 180 STEP 20:LINE(270,L)-(314,L),1:NEXT L
740 GOSUB 1000
750 LOCATE 3,20:PRINT" ROBOMATH ";
760 LOCATE 2,35:PRINT"FULL!"
770 DRAW"BM7,180;C1E4R5F2R2E3R5F6E5R2F4E3R13F2E8F3D2R5E5R2F7R3E5R5F8E6BD3BL2P1,1
"
780 DRAW"BM52,176;C2U8L3G3H1E3R3U1R5D1R3F3G1H3L3D8L1U3L1D3BR1BU5C2P3,2
790 CIRCLE(53,162),3,3:PAINT(53,162),3,3:LINE(51,161)-(55,161),2:LINE(53,164)-(5
3,164),2:DRAW"BM53,159;C2E4BL8F4"
800 LOCATE 3,4:PRINT"*":LOCATE 4,9:PRINT"*":LOCATE 7,3:PRINT"*":LOCATE 6,14:PRIN
T"*":LOCATE 9,4:PRINT"*":LOCATE 10,13:PRINT"*"
810 LOCATE 3,13:PRINT CHR$(237);
820 CIRCLE(56,45),20,1,,,4:PAINT(56,45),1,1
830 LINE(36,43)-(76,47),2,BF
840 FOR CC=40 TO 72 STEP 8:CIRCLE(CC,45),3,3:NEXT CC
850 '
860 '*** MAKE LARGE LETTERS ***
870 '
880 A$="C1U30R20D15L5F5D10L5U10H5L5D15L5BR5BU20U6R8D6L8BD3P2,1"
890 O$="C1U30R20D30L20BE5U20R10D20L10BD1P3,1"
900 B$="C1U30R20D12G3F3D12L20BE5U20R9D5G5F5D5L9BG2P2,1"
910 DRAW"BM140,180;XA$;"
920 DRAW"BM170,180;XO$;"
930 DRAW"BM200,180;XB$;"
940 DRAW"BM230,180;XO$;"
950 RETURN
960 '
970 '*** BLANK OUT INPUT AREA ***
980 '
990 FOR X=1 TO 10:COLOR 1:COLOR 0:NEXT
1000 FOR BL=5 TO 11:LOCATE BL,19:PRINT" ";:NEXT BL
1010 RETURN
1020 '
1030 '*** SEND MESSAGE TO SAUCER ***
1040 '
1050 LINE(49,154)-(56,55),1:LINE(57,154)-(55,55),3
1060 PLAY"V15T255L6406FC05FC04FC03FC"
1070 LINE(49,154)-(56,55),0:LINE(57,154)-(55,55),0
1080 RETURN
1090 '

```

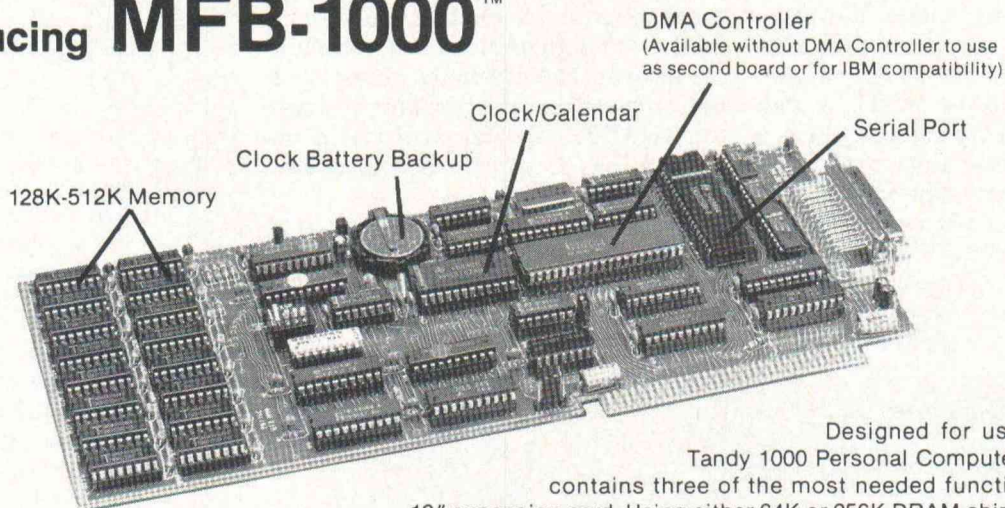
```

1100 '*** THE RESCUE OPERATION ***
1110 '
1120 GOSUB 1000
1130 LOCATE 6,21:PRINT "PREPARE"
1140 LOCATE 7,23:PRINT"FOR"
1150 LOCATE 8,21:PRINT"RESCUE!"
1160 BEAM$=CHR$(222)+CHR$(219)+CHR$(219)+CHR$(221)
1170 FOR TRACTOR=8 TO 22:LOCATE TRACTOR,6:PRINT BEAM$;:PLAY "T255V15L3203C":NEXT
    TRACTOR
1180 GOSUB 1000
1190 LOCATE 6,20:PRINT"WE GOT HIM!"
1200 FOR DL=1 TO 600:NEXT
1210 FOR TRACTOR=22 TO 8 STEP-1:LOCATE TRACTOR,6:PRINT"      ";:PLAY"T255V15L3201F
    ":NEXT TRACTOR
1220 LINE(55,175)-(48,55),2:LINE-(62,55),2:LINE-(55,175),2:PAINT(55,60),2,2
1230 FOR TRACTOR=22 TO 8 STEP-1:LOCATE TRACTOR,6:COLOR 1:PRINT"      ";:COLOR 0:OU
    T &H61,&H6C:OUT &HC0,&HE0+1*4+0:FOR I=1 TO 15:OUT &HC0,&HF0+I:NEXT I:NEXT TRACTO
    R
1240 LINE(32,30)-(78,60),0,BF
1250 '
1260 '*** DO IT AGAIN? ***
1270 '
1280 LOCATE 4,6:PRINT"WOW !"
1290 LOCATE 5,5:PRINT"HEY PAL"
1300 LOCATE 7,3:PRINT"PLAY AGAIN?"
1310 LOCATE 8,5:PRINT"[Y/N]"
1320 AG$=INKEY$:IF AG$=""THEN 1320
1330 IF AG$="Y" OR AG$="y" THEN RUN ELSE SCREEN 0:KEY ON:WIDTH 80:CLS

```

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Data communications has become one of the fastest growing fields in microcomputing. With so many database networks currently available, including national and local electronic bulletin boards, the exchange of information has prompted hardware manufacturers to offer a whole range of equipment to meet the growing demand. But without good software, the capabilities of the hardware are never tapped. If you are presently using your microcomputer for data communications or are thinking about entering this fascinating area, you should consider *MITE*.

MITE is an all-purpose data communications software package for microcomputers. It is a highly versatile program that can run under four popular operating systems: Digital Research's CP/M and CP/M-86, Microsoft's MS-DOS, IBM's PC-DOS and Apple's Macintosh Operating System.

It can access almost any online time-sharing system that supports ASCII terminals. Most online networks are compatible with *MITE*, including Telenet, Tymnet, The Source, CompuServe and Dow Jones News Service. It can perform file transfers with other

microcomputers that run *Clink*, *Smartcom* and *CrossTalk*, as well as Western Union's TWX network.

As you can see, *MITE* is indeed a flexible program, but to give you a better idea of its capabilities, let's look at some of its features.

Since *MITE* is a menu-driven program, it is easy to use. After loading the program, you are presented with the main menu which lists the various operating options. See Figure 1.

Selecting the G option takes you directly into the terminal mode of the program, and whatever parameters you have chosen through the other options are immediately executed.

The H option is used to hang up the phone at any time. Some communication systems require you to hang up in order to terminate the link, while some hardware configurations will not allow the software to hang up the phone. This option gives you the flexibility to customize *MITE* for your particular communications link and specific equipment.

The I option allows you to enter a one-line description of your communications site. The site identification is sent to any user who is dialing into your system.

Choosing the L option will allow you to load parameters from a previously-saved parameter file which you have defined for your communication system.

The S option allows you to save the current parameters to a disk file for future reference or use with the L option.

The L and S options are used in conjunction with the P, "Parameter" submenu. The parameter menu is where you can change the various characteristics of your communication system. Figure 2 is the list of parameters, along with their default values:

Figure 2:
***MITE* Communications Parameters**

B	- Baud Rate	=	300
D	- Data Bits	=	7
P	- Parity	=	EVEN
S	- Stop Bits	=	1
R	- Role (ANS/DRG)	=	DRG
E	- Entry Password	=	
M	- Mode (Duplex)	=	FULL
A	- Auto Redial Count	=	0
N	- Phone Number	=	
I	- Modem Init String	=	
H	- Dial Prefix	=	

When *MITE* is loaded, the default values are always assumed by the program. With the S option, you can save your chosen parameter values to a disk file so that they can be loaded, using the L option, without having to redefine the parameters each time you use the program.

The "Option" submenu (O) allows you to define certain control functions of the communications link, such as CAPS lock, auto line-feed after carriage-return, "TWX" mode (Western Union terminal mode), direct connect mode and other command functions. You may also define a particular keystroke combination to perform local commands during the communication link,

Figure 1: *MITE* Main Menu

G - Go Start Communications
H - Hangup Phone
I - Enter Site ID
L - Load Parameters from Disk File
S - Save Parameters on Disk File

Submenus:

P - Parameter	O - Option
U - Upload / Sent Text	D - Download / Capture Text
B - Binary File Xfer	M - Macro Definition
C - Command Processor	F - Character Filter
T - Special Features	E - Emulations

such as an escape trigger for immediate transfer back to the main menu, or executing a predetermined break (pause) in the operation.

The next three submenu options, U, Upload / Send Text; D, Download / Capture Text and B, Binary File Xfer allow you to transmit or receive information to or from the remote system. Each option has its own menu, from which you may change specific parameters of the transfer operation. Because of *MITE*'s versatility, you can configure the communication variables to almost any computer system — a strong plus for the program.

One of the most interesting features is the macro definition option: M, Macro Definition. With it you can view or define up to 10 prestored macro strings, each up to 62 characters long. The most common application of these strings would be a customized login command. They can also be used to send predefined messages to the remote system. The program has an editor which you can use to alter or move characters within the predefined strings. This is a highly useful feature.

The next submenu option, C, Command Processor, is like an internal little operating system. From the submenu, you can perform disk file operations such as copying, deleting, listing, renaming, etc. All these functions are similar to the commands found in most disk operating systems. You can do these operations without exiting the program and breaking the communications link.

In some instances when communicating with a mainframe computer or some networks, the remote system may send characters that will cause certain microcomputers to do strange things with the screen display, such as not clearing the screen when the cursor is "homed" or deleting information from the screen prematurely. The Character Filter option, C, allows you to define which of those unwanted remote system characters you wish *MITE* to ignore. You must know, of course, which remote characters are causing the problem before entering them through this menu. But once the characters codes are entered, you will have no more difficulty with oddly-behaving screen displays.

The Special Features submenu, T, takes advantage of the special system features of the IBM PC and PC compatibles. The menu offers options for changing serial ports, redefining the

location of the RS-232 serial port for those machines with an internal modem and choosing colors for foreground, background and highlighting. For the foreground, there are 16 colors available. For the background, there are eight colors available. Though this menu is not critical to a normal communications link, it gives you a chance to brighten up the text displays — a nice touch.

The last submenu of the main menu is E, Emulations. This is the most powerful feature of *MITE*. It gives you the ability to make your computer act as though it were a totally different terminal. By using the S and M options of the emulation menu, you can select the terminal manufacturer's name and terminal model you wish to emulate.

The program supports a wide variety of manufacturers, such as Digital, IBM, Datapoint, Hewlett-Packard, Data General and many others. The support list is displayed after the S option is chosen. After a particular manufacturer is entered, another selection list is displayed showing the specific models that the program supports. Once you have selected the model, you can return to the main emulation menu where you can switch on the emulation system.

If you are just entering the world of data communications, you may think that using *MITE* would be complicated, particularly because of its varied and powerful functions. Don't be con-

cerned. Chapter 2 of the *MITE User's Guide* is specifically written as an introduction for beginners. In it, you'll find all the basic information necessary to become familiar with data communications, including the fundamentals of the necessary hardware. It is quick and easy reading and lays a firm foundation.

In addition, Chapter 16 outlines specific instructions on the installation of various popular modems to your computer system, including the type of cable that is required for the connection. Illustrations are given to help you identify specific configurations. The presentation in this chapter is excellent.

Appendix A, "A Practical Guide to RS-232 Interfacing" and Appendix B, "Introduction to Data Communications" will expand your knowledge of the RS-232 format and data communications. By the time you've finished going through this material, and it doesn't take long, you'll be well versed in the field, ready to set up your own system.

It isn't often that one finds such a versatile software package as *MITE*. Both the expert and the beginner will find the program to be one of the best communication packages on the market today.

(Mycroft Labs, Inc., P.O. Box 6045, Tallahassee, FL 32314, \$195)

— Ralph Rideout

Software 1000/1200/3000

FABS and *AUTOSORT*: File Management For Programmers

I have good news and bad news about *FABS/86M*. The good news is that if you can make it work like the demo program, this utility will allow you to write a BASIC program that will manage huge data files very efficiently. The bad news is that the documentation of this rather complex program is terrible.

First, let me tell you what *FABS/86M* will do for you. The current state of the art in maintaining large data files uses an indexing technique called B-

trees. This is the way most of the well-known database manager programs allow access to databases quickly. *FABS/86M* is a machine language program that loads itself into memory and will do all the work of maintaining a B-tree index through calls from user programs written in BASIC and certain other languages. When it is time to add a record to the data file, a call to *FABS* will yield the record number that the added item should be written to in a random access file. Another call to *FABS* can search for a record, delete a record or get information about the file. The advantage of all this is that, according to the documentation, the B-tree index can be searched in about two seconds even for a file as large as 50,000 records. This is certainly possible for a good B-tree algorithm.

All this sounded pretty good to me. I have attempted to learn enough about B-trees to write my own routines, but never quite made it. I looked forward

to using *FABS*. That lasted about three more pages. The third time I read the manual that came with *FABS*, I began to have a glimmer of what was going on. The documentation felt like it had been written by a programmer who knew too much for the rest of us. Most of the information an experienced programmer would need is there, but the rest of us are on our own for a lot of the details. Descriptions of individual calls to *FABS* give all of the format details, but not even a single example. When I screwed up my courage and loaded the sample program, I found a few examples by looking through the code of the program.

Using *FABS* presents some problems even if you survive the manual. If you use it from BASIC, you must run *FABS86M.COM* before you enter BASIC. The manual recommends that you use an *autoexec.bat* file to load the program. That is good advice because you *must* tell your BASIC program the segment address where *FABS* has loaded itself. *FABS* reports that address on the screen as it loads. You then have to include a line in your BASIC program setting a variable called *FSEG* equal to

the address shown. There is a way to have *FABS* write a one line file to disk containing the address. The manual gives three lines of code necessary for your program to read that file and set the address itself. If all of this sounds cumbersome, I thought so too.

If you are still with me, the rest of the operation is a little easier. *FABS* is accessed by building a string of the right items and then calling *FABS*. After the call is complete, a variable called *RECNO* will have the record number of the item you asked for. *FABS* also makes available the key itself, but not very easily. An address is returned and the key must be assembled by a routine that peeks characters starting at the address given.

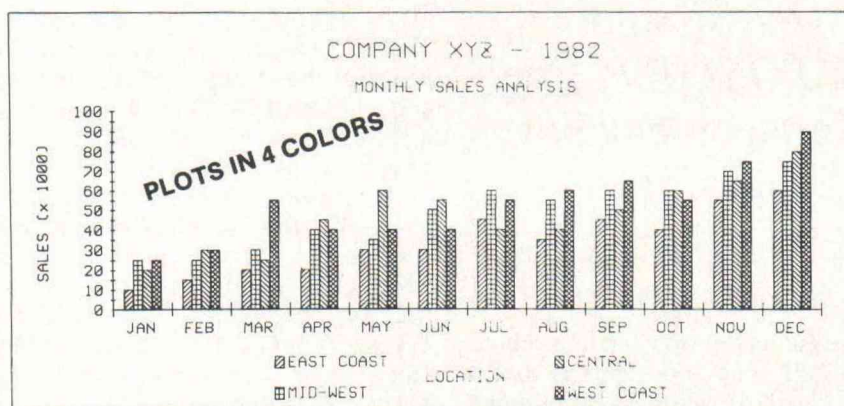
I thought I would try this wonder out on a random access file I had created some time ago. The file had grown enough that it might benefit from the speedier access. Even though I carefully plagiarized from the manual and the sample programs, I could not get *FABS* to work. My first call to the program was a "create" command. My short BASIC program got to the *CALL* statement for *FABS* and went away for

about five seconds. Then it came back to report a "Divide overflow" and dumped me out of BASIC back to DOS level. This error message is not listed in either my BASIC or DOS manual, so perhaps it is supposed to be self-explanatory. In any case, since it occurred within *FABS*, I could not do any further diagnosis. At this point I gave up on experimenting. Their supplied BASIC program to demonstrate the features of *FABS* works, so I do not know if this is a real bug or the result of poor documentation.

FABS is a good idea, but a very awkward thing to use. It seems a contradiction to me; if you are a good enough programmer to use this package with present documentation, you are probably good enough that you don't need it. I called for technical support very early in the process primarily to ask if some of the manual had been omitted from the package I received. The person I spoke to assured me that I had the complete manual. He was polite and gets high marks for honesty as he freely admitted that their manual had been criticized before. My final recommendation would be that if you have a

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program to write that must manage a large data file and access it randomly and quickly, *FABS* might be worth the work.

FABS is not copy protected in any way and an OBJ version is also supplied. This version can be linked to compiled programs. This will at least remove the need for the segment address gymnastics required for the program's use with BASIC.

AUTOSORT86/M is a package of several programs designed to sort and/or select records from MS-DOS disk files. The sort/selection process can be initiated either from within an application program or from DOS level. *AUTOSORT* is used from BASIC in the same way as *FABS86M* mentioned above. The same problems of adjusting the segment address apply to *AUTOSORT*.

The two programs seem to share another problem, too. The manual for *AUTOSORT* seems to have been written by the same author as *FABS*. *AU-*

TOSORT's documentation seemed to be a little better, but that could have been that I read it after confronting the *FABS/86M* manual.

There was another disturbing similarity, too. The demo run directly from DOS level seemed to work fine. Answering the questions as suggested in the documentation resulted in the appearance of a "Sorting — do not disturb" message. The manual said to expect 10 seconds to sort the 500 record sample file and write it to an output file. In fact, it only took about four seconds, but that was on a Tandy 2000 with a hard disk. I tried to list the file with a DOS type command, but all I got was one line. The file was originally written with BASIC and evidently contains end-of-file characters in each record. The BASIC file supplied to list the file did list it, and it was indeed sorted on the field indicated. The problem came when I tried to use the BASIC program supplied to initiate the sort from within BASIC. I ran the .COM file as directed, loaded

the BASIC program, adjusted the segment address and typed RUN. A funny thing happened. After three seconds or so, my old friend "Divide overflow" appeared and there I was back at DOS.

Now I wonder what the problem is with both these programs. The manual refers constantly to BASIC-86, but the tech person I talked to assured me that the GW-BASIC supplied with my Tandy 2000 would work. I am sorry, readers, that I can't give more information about the workings of *AUTOSORT*, but I do get frustrated.

My summary here would be similar to that for *FABS*. If you have very large files that need to be sorted quickly in different ways, *AUTOSORT* might be worth the trouble of learning. The program is not copy protected.

(Computer Control Systems Inc., Route 3, Box 168, Lake City, FL 32055, 904-752-0912, *FABS/86M* \$150., *AUTOSORT/86M* \$150.)

— J. Potter Orr

Software

100

DO4MAT Offers Big Computer Formatting

DO4MAT, the latest software from BKI, College Park, Md., is a powerful text formatter for the Model 100 whose capabilities can be favorably compared to those of formatters for 16- and 32-bit desk-top computers. In fact, it almost might be considered overkill for such limited hardware. The 100's limitations force several large compromises on the program, but for the money it is an excellent buy that can make your 100 much more useful than you ever expected.

DO4MAT has 48 formatting commands, ranging from basics, such as number of characters per line, to alternate input and conditional statements that allow the program to customize form business letters addressed to names on a mailing list. These commands take the form of a period followed by a two-letter mnemonic code such as .c1 for setting the number of characters per line. These can be listed at the beginning of a piece to establish

the overall format or can be imbedded in lines. Thus you can change the indentation or tab settings, or (provided your printer supports them) switch type fonts and sizes at will.

These commands can be divided into 10 groups: page layout, line and page control, indentation, character control, justification, tabs and columns, headers and footers, alternate input, variables and conditionals. A few examples illustrate *DO4MAT*'s design.

Indentation, or rather its lack, is a major problem on the Model 100 as you quickly discover when you try to build an outline. The best the Model 100 can offer is its tab command which allows you to indent the first line of a paragraph or section but not every line. *DO4MAT* allows you to indent sections of an outline or article any distance from the left margin you choose by simply inserting a dot command.

Another command called "temporary indentation" allows you to move a single line either to the left or right any distance you choose. This is handy, for instance, if you are writing a list of numbered points and wish to indent the entire list but have the numbers appear to the left of the text to stand out.

The 100's tab command is a source of frustration, particularly when you try to create a table with words and figures arranged in columns and print it using type that is relatively spaced (as it is

when printed in a magazine) rather than typewriter-like absolute spacing. No matter how carefully you arrange them on screen, when you print them out the columns will not line up because the 100 defines its tab spacing by number of characters rather than by inches of distance along the line. *DO4MAT* ends this problem by providing absolute, user-definable tab spacing. You set the tabs with the .ta{N,N...} command, where the N's are the number of inches from the left margin for each tab setting. This gives absolute tab settings that allow your columns to line up perfectly when you print out tables, even if you change type sizes between lines. Furthermore, you change tab settings to suit your needs of the moment and align your tab columns on the left, right or center, or on a particular character such as the decimal point for even listing of columns of figures.

Alternate input is an advanced capability that allows you to create alternate and formatting files. When *DO4MAT* reaches an alternate input command such as .a1{file name}+ imbedded in a text, it refers to that file, following any directions or printing any text it finds there. The original input file .o1 returns *DO4MAT* to the original text file. You can switch back and forth between two files at will using these commands, and each time you go back to the alternate input file *DO4MAT* will

Three MS-DOS Utilities from ALPS

take up where it left off. This allows you to create an alternate input file of names and addresses of customers, then create a single letter (announcing a new product, for instance) and have *DO4MAT* print copies addressed to each person on the list.

Conditional processing allows *DO4MAT* to customize those letters to reflect differences in status among your customers. The program has two conditional statements, "skip if" and "skip if not." For instance, a software company might create a mailing list of customers with modifiers indicating what products each owns. When this company upgrades a program, it would want to send letters to all the owners of the program to offer them the upgrade.

At the same time, the company might want to write to all its other customers offering the improved program to them at a special rate. You can write one letter with alternate paragraphs describing the two offers and use conditional statements to specify that customers with the code indicating they own the old version of the product get the paragraph offering the upgrade; all others get the one offering the full new program.

Of course there are tradeoffs. The greatest is speed. *DO4MAT* is slow, and if you plan to print long files you had better find something else to do while it is working. This is mainly a limitation of the computer, itself, and is something that BKI has little control over. But, after all, a Model 100 with *DO4MAT* costs a fraction of the price of an IBM PC and word processor, for instance, and cannot be expected to provide the same performance.

DO4MAT is also hard to use. In spite of good documentation, you will have to study and experiment to master some commands. If you want to use the print control commands and have an unsupported printer, you must write your own printer capabilities file. Called "Prtcap" by BKI, this is a separate file consisting of a long string of numbers that defines what your printer can do and what signals the program must send to it to set it for various print sizes and shapes. This is not a major job for a programmer, but for someone without programming experience it can be formidable.

However, if you do not need special print fonts (or if you use an impact printer whose fonts cannot be changed by software) you can simply ignore the Prtcap — *DO4MAT* will do all other

formatting chores without it. If you do need to change type within texts, a Prtcap is well worth the effort as with it *DO4MAT* will give you total freedom to switch from one font and size to another. BKI has offered to supply Prtcap files for common printers on request.

The size of the program and the small memory of the Model 100 is another issue. *DO4MAT* takes up 8,500 bytes, a quarter of the maximum size of a Model 100's memory bank. This might be a major problem, but BKI has attacked it successfully using its *XIN* and *XOUT* utilities. These allow you to place your finished text files on tape, delete them from the computer and load *DO4MAT*. Then you access the text files with *XIN* and format and print them directly from tape without reloading them into the computer's memory.

DO4MAT also can create a single document from several text files by allowing you to specify the page number for the first page of each file. You can break a long report down into chapters, write each chapter as a separate file and print them consecutively to create one report on paper that is longer than the maximum file size your 100 can store. In fact, BKI wrote its manual for *DO4MAT* on a Model 100 as a series of separate files. *XIN* and *XOUT* are, by the way, very useful in their own right and well worth the money if you commonly store your files on cassette.

DO4MAT's manual is unusually well-organized and written in good, plain English rather than computerese. With only very few omissions or errors, everything is explained carefully and illustrated with clear examples. It goes far toward making *DO4MAT* easier to use.

While not perfect, *DO4MAT* is an excellent formatter at a very low cost. It is well worth the price and trouble to anyone using the Model 100 as a text processor. Even if you only use a few of its features you will find it well worth the investment, and combined with *XIN* and *XOUT* it becomes a very handy system for printing long texts on a limited machine. It is recommended for anyone needing advanced text formatting for the Model 100.

(BKI, P.O. Box 218, College Park, MD 20740, 301-345-9473, \$40, in a package with *XIN* and *XOUT* and the BASIC program formatter BA4MAT, \$100.)

— G. Berton Latamore

MS-DOS is the standard operating system for 16-bit personal computers such as the Tandy 1000, 1200 and 2000. It has become dominant because of the market success of the IBM PCs, not because it's easy to use. For the ordinary user, simple tasks like formatting diskettes, copying files and making backups are needlessly complex. For more advanced users, such as those with multiple programs on hard disks, or those accustomed to the niceties of Radio Shack's TRSDOS, MS-DOS lacks a number of features which can make file handling less a chore than it is.

To help make your MS-DOS sessions more productive, ALPS markets the three packages of assorted utilities reviewed here on a Tandy 2000HD with 256K. Each individual utility is comparable in size to the MS-DOS external commands, and is called in the same way:

COMMAND *pathname parameters*

Each package consists of a few pages of instructions and a diskette. Though the documentation and the diskettes indicate that the programs are for the Tandy 1000, 1200, 2000, IBM PC, XT and AT, the diskettes supplied were 740K Tandy 2000 format. The instructions are brief but generally clear. The programs may be copied to your working diskettes or hard disk. If you place them in the same directory where you keep your standard MS-DOS commands, they will be available whenever you need them.

Directory/File/Backup Utilities

This set of four utilities seems designed primarily for owners of hard disks, though my favorite of the bunch, *DI.COM*, will definitely be popular with anyone who has ever had a hard time picking out a particular filename in a crowded directory. This little gem improves on the *DIR* command by listing all the files and sub-directories in your current directory in five-column format, alphabetized with the spaces between filename and extension removed. Sub-directories are identified by a diamond next to their names. The

entire display is neatly enclosed in a nice border.

The path name can include wildcard characters. There are three optional parameters with which you can have "hidden" files included in the listing, list only files which have been modified since the last backup or list the files in single-column format with no leading or trailing blanks and no header or trailer lines. Parameters may be specified in any order as long as they are separated by one or more spaces.

BACKMOD.EXE is supposed to be an improvement on the standard hard disk BACKUP command. It selects the files to be backed up, sorts them by filename and copies them onto the target diskette in alphabetical order. By default, only files which have been modified since the last backup are copied, but an optional parameter lets you include unmodified files as well. The best thing about BACKMOD is that the copied files can be directly restored with the COPY command, unlike MS-DOS's BACKUP which writes files that can only be restored with RESTORE.

Unfortunately, BACKMOD does not recognize the default directory on the target disk, forcing you to type its name in the command line. If you forget, your files will be copied into the root directory of the target disk.

Even worse, BACKMOD does not recognize a "disk full" condition, but continues to add filenames to the target directory, each with a length of zero bytes, until MS-DOS finally gags with an "unable to create file" error message. Also, it works with only one source directory at a time. I would strongly recommend to any purchaser of this package to not use BACKMOD in its current form.

FINDF.EXE searches for a filename in all the directories throughout the current drive and displays the full path name for all occurrences. This could be a great utility. Unfortunately, FINDF does not recognize wildcards. This means you can only search for one file at a time and you must remember the exact filename and extension of the file you want to find. For example, FINDF SALES.* will not find all files named SALES with extensions of DAT, BAS, EXE, etc., even if they are in your current directory. Even so, it comes in handy when you've forgotten where you put a particular file, or you've lost track of all the directories you copied it into.

DTREE.EXE rounds out this group of utilities. It displays the hierarchy of

directories below the current or specified directory path. This command comes in handy when you need to know the names and relationships of the directories on a disk. Some versions of MS-DOS come with the TREE command, but it's not on the Tandy 2000 version.

I only found one small irritation with this program. Typing DTREE by itself while in a sub-directory does not automatically list the directories below the current one, but lists all directories from the root. If you want to list only the directories below your current one, you must type DTREE followed by your

current directory name — an unnecessary annoyance.

User Tool Assortment

For the general use, ALPS offers this assortment of four utility programs.

HEXDUMP.COM neatly displays the hexadecimal and ASCII contents of a file. There isn't much to distinguish HEXDUMP from DEBUG's display, except HEXDUMP lets you browse through a file more easily, using the PG UP and PG DN keys to page 256 bytes at a time, or the arrow keys to move 4K bytes at a time. You cannot, however, scroll one line at a time, nor can you edit the

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contents of the file.

KB.COM lets you assign up to 120 characters to the following keys and combination of keys: F1 through F12, ALT-A through ALT-Z, ALT-0 through ALT-9, CTRL-A through CTRL-Z, DELETE, INSERT, HOME, END, PG UP, PG DN, ESC, TAB, BACK SPACE, SHIFT-TAB and BREAK. This lets you enter repetitive or complex commands by pressing one or two keys, instead of typing the commands each time. A good feature here is being able to assign multiple command lines to one key. KB lets you do this by typing a ~ where you would normally press ENTER. It is important to keep in mind that these assignments remain active even when you run an application. If you run a program which uses the keys you have assigned for other purposes, unexpected things can happen. Accordingly, KB lets you delete your definitions easily whenever necessary, as long as you are at the MS-DOS prompt.

A feature of KB which should be of particular interest to programmers is its ability to cause a particular key to be ignored by the computer. BASIC programmers can turn off the BREAK and

CTRL-C keys to prevent a user from accidentally interrupting a running program.

LINECNT.COM is sweet and simple. It counts the number of lines in a text file, with a line being defined as any text that is terminated with a carriage return (0A Hex). What can you say about a line counting program? If you need one, here it is.

CHMOD.EXE allows you to modify the attributes of any file you have on disk. The allowable attributes are: Read Only, the file cannot be written to or deleted; Hidden, the filename will not be listed in the directory; System, a system file; Archive, the file has been modified since it was last backed-up; and Reset, normal attributes (not Read Only and not Hidden). When a file is marked as Hidden, it cannot be copied or deleted. If it is Read Only, it cannot be deleted. Attempting either of these operations will result in a "File Not Found" error.

CHMOD also allows you to examine the attributes of a file by typing a question mark (?) after its name, but it does not allow you to use wildcards to examine the file attributes of a group of

files. This forces you to type each filename one at a time to find the attribute status of your files or to set the attributes of a related group of files.

RAMDISK

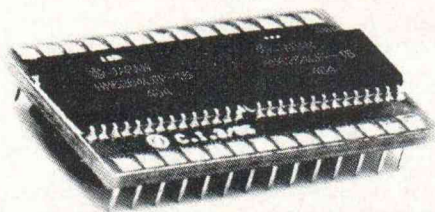
RAMDISK.DVR allows you to set aside part of your RAM to be used as an electronic disk drive which appears to the computer as if it were an actual disk drive. You can then store commonly-used programs or data on the RAM disk and have them load at "instant" speed whenever they are needed. The RAM disk appears to the system as a non-removable hard disk drive, but it will not work correctly if a program running on it depends on internal characteristics such as sector and cylinder sizes.

Of course, dedicating a large chunk of memory to a RAM disk will effectively lower the amount of memory you will have to run your programs. Since most applications programs require at least 128K (usually more), and MS-DOS itself requires 40 to 50K, RAM disks are most useful for users with a large amount of memory installed in their machines. When you consider that

24K Expansion RAM

For the Model 200

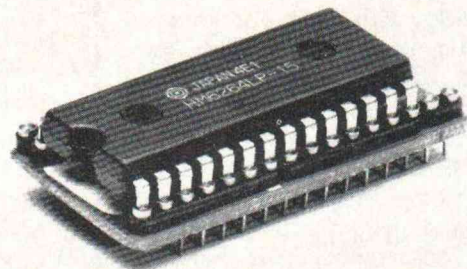
\$125. each **\$240.** for two



8K Expansion RAM

For the Model 100 & 8201

\$27. each **\$75.** package of 3



These Modules are easily user installable and they feature:

- Low Power CMOS Static RAM
- 30 Day Satisfaction Full Refund Policy
- High Quality Sockets
- Instructions Include Test Program Listing
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Cryptronics, Inc.

11711 Coley River Circle, Suite 7
Fountain Valley, CA 92708
Phone: (714) 540-1174

Tandy 2000 disks hold 720K, it is obvious that you won't be able to set up a RAM disk anywhere near that size. If you have 256K or less, as I do, you can forget about using a RAM disk. I was only able to set up a 64K RAM disk and this simply isn't enough to do anything useful.

According to the documentation, the RAM disk is supposed to be assigned the next higher unused drive number at the time that its DEVICE statement is encountered in the configuration file CONFIG.SYS. If you already have other devices, the RAM disk statement can either go before or after those device statements and the drive numbers will be assigned accordingly. For some reason, though, I could not find a way

to set up the RAM disk as any drive other than Drive E, even though I only have Drives A and C. Rearranging my device assignments in my CONFIG.SYS file had no effect.

Conclusion

Each of these packages sell for \$59, which is reasonable for software in the MS-DOS world. Most of the functions you get in return for this money, however, can be had for free if you browse through the tremendous amount of public domain software which has accumulated for MS-DOS.

(ALPS, 1502 County Road 25, Woodland Park, CO 80863, (303) 687-1442)

— Victor Scheluchin

Software 1000/1200/3000

*Astro*Talk* Delivers the Message of the Stars

"As above, so below," noted the ancient astrologers as they sought to understand humankind's significance in the cosmos. Today, people read their horoscopes in daily newspapers even if (and perhaps rightly so) such copy appears on the comics page. Still astrology continues to fascinate many people as they search for correlation and significance in a technology-based, yet often chaotic society. Matrix Software has grasped the horns of this dilemma and developed software for the amateur or professional astrologer. Now your Tandy 1000, 1200 or 3000 can delineate the locations of the planets at a given time and date and interpret the indications with *Astro*Talk*.

*Astro*Talk* begins with a brief history of Matrix Software and a concise summation of astrological philosophy emphasizing the interrelatedness of such "events" as the motion of celestial bodies and the emergence of a soul in flesh (birth). *Astro*Talk* allows data entry of birth information in three ways, depending on the amount of information available. Date and year are the data required with the first format; the second asks for date, year, time of day and time zone (calculated in the hours the zone is away from Greenwich,

England); the third format requires all of the above and the geographical coordinates (longitude and latitude). The more information one can provide the more detailed the chart.

*Astro*Talk* is designed to produce charts using the Tropical (geocentric) Zodiac. This is the most popular zodiac used in the U.S.A., but there is also an option for the Sidereal (heliocentric) Zodiac. This form of astrology calculates the planet positions as viewed from the sun rather than Earth. The Sidereal Zodiac is used by astrologers charting a view of "inner realities" and is called a Karma-scope. There is a Help/Information key and a Student AstroGuide, which offer brief descriptions of the signs of the zodiac, house positions, ascendants and aspects.

Now to the fun part — running a chart. After the birth information is entered, a menu appears with these chart options: Who You Are, detailing the indications of the sun in a particular sign; Surroundings, for the moon's influential placement; Mental Notes, for Mercury (which also rules communications); Love Life, the location of Venus (of course!); Basic Drive, for aggressive Mars; Life Path, for the location of Jupiter's greater beneficence; Life Challenge, for stern Saturn; Independence, for electric Uranus; Power Factor, which details the placement of nuclear Pluto; Appearance, for the ascendant's role in the persona we present to the world; and finally, Career Skills, for the mid-heaven's indications of natural talents and interests.

There is an unfortunate, but probably unavoidable, circumstance when dealing with *Astro*Talk*, and that is seeing

the same screens appear in various contexts in the chart options. For instance, if the user chooses surroundings and reads the screen detailing the moon's conjunction with Pluto, the same screen will be shown again when the user chooses the Power Factor and sees Pluto's conjunction with the moon. A chart laden with any of the primary aspects will seem redundant to the user. However, in all fairness, these aspects are regarded to be the most important and influential.

In the Student AstroGuide these primary aspects — conjunction, opposition, trine and square — are briefly detailed along with the Koch placement of the houses in the Tropical Zodiac.

These two sections are the most interesting to me as an amateur astrologer; but alas, they are the shortest. Each aspect or house has only one screen of information.

This is a well-thought-out and interesting astrology program that ran flawlessly on my Tandy 1200 HD (which I suspect is a playful Sagittarian). Matrix Software offers excellent support and I would recommend *Astro*Talk* to anyone who wants to further his or her study of the oldest body of knowledge on this planet.

(Matrix Software, 315 Marion Avenue, Big Rapids, MI 49307, (616) 796-2483, \$39.95)

— Rebecca C. Brueck

Exploring the Radio Shack Model 100: Filling in the Blanks

In the *ideal* computer world, manuals would be complete and self-contained. Literally everything you wanted to know would be easy to locate in one book. Instructions would be simple, clear and easy to follow. Application information would include all possible variations and a few surprising uses for the machine.

But here in the *real* world, most manuals leave ample room for improvement. While the manual that comes with your Model 100 is surprisingly good, it, too, leaves holes the size of Tandy's home state of Texas. Such holes present opportunities for knowledgeable authors to fill in the blanks.

Marvin C. Mallon is one such author, and *Exploring the Radio Shack Model 100* attempts to be one such book. His stated purpose is to show what the Model 100 can and cannot do and to address those who presently own the machine as well as those who are considering it.

The first five chapters cover the basics of the machine. *Exploring the Radio Shack Model 100* begins with a tour of initial startup, the keyboard, screen, input/output connectors and printer considerations. The information presented in this section is solid and accu-

rate, but if you already have the manual, there is nothing either novel or new in the presentation.

In the chapter "Working with the Printer," Mr. Mallon broadly outlines the available types of printers, but he never mentions those constant compatibility considerations. Since the Model 100 is often a second computer, many owners try to attach their portable to the printer on their desk-top computer and encounter problems. A discussion of the problems using non-Radio Shack printers with the Model 100 would be a real service. Prospective owners would be better informed about potential problems ahead and may even modify their printer choices. Current owners could always benefit from a full exploration of the problem.

Exploring the Radio Shack Model 100 fares better examining the wealth of options available. The sections on expanding memory, the Disk/Video Interface and the Bar Code Wand offer significant insights into new application possibilities. Any but the most up-to-date owner will pick up interesting details here.

The chapter on the Bar Code Wand is especially good. In answer to the question, "but what can I use it for?" Mr. Mallon responds with a detailed description of the process of scanning BASIC programs from the pages of PCM. Even without the other information on the "BCR connection," this explanation is a real asset to present and potential owners.

The exploration of the ROM applications offers no more depth than the manual, but there are high points. Rather than try to cover all the material on Model 100 BASIC, Mr. Mallon fo-

cuses on those aspects of BASIC unique to the Model 100 dialect. Graphics statements are a natural because of the LCD. Controlling the clock and generating sound with your portable are also discussed. In this way, someone familiar with BASIC on other machines can quickly grasp the special features of Model 100 BASIC.

Mallon notes that TEXT is limited, particularly in print formatting. To help compensate, he includes a simple BASIC program to take care of printing essentials like margins and line spacing. More importantly, he mentions the process of transferring a text file to another computer with more extensive word processing capabilities. Text can be created anywhere, stored in RAM and later transmitted to a desk-top machine for final editing and printing.

Given the wealth of add-on hardware and software available, the chapter on "Add-On Products and Services" is only a superficial sampling. The software section offers little more than examples of categories available. Conspicuously absent from the list are the ROM programs that are now available. There is no mention under "spread-

sheets" of *Multiplan* or *Lucid*. The creators of *Lucid*, Portable Computer Support Group, are mentioned, but none of their ROM offerings made it into print. This is an especially noticeable omission from a book with a copyright date of 1985.

Under the services section, Mr. Mallon lists CompuServe and explains how to get a free online demonstration. Yet he fails to mention the Model 100 Special Interest Group (SIG) on CompuServe which has been very active since the machine's introduction. How better to see the value of online information than in a SIG filled with useful software, hints and information exchange?

Exploring the Radio Shack Model 100 contains many illustrations and diagrams that will look very familiar to current owners because they are borrowed direct from the Model 100 manual. Oddly, a number of the illustrations clearly picture the NEC PC-8201 rather than the Tandy machine (notably in the chapter on programming languages). While this is a trivial oversight, there is a real problem with some of the charts reproduced from the manual. There are

numerous discrepancies between Mr. Mallon's pin diagrams for the various input/output connectors on the Model 100 and Radio Shack's. Some of these errors are insignificant like omitting the description of Pin 6 on the modem interface. Others, like labeling Pin 17 of the external bus as "INTA" instead of "INTR," could be a real nuisance. Nothing is more frustrating than incomplete or inaccurate pin diagrams when you are trying to wire your own connectors.

Mallon offers some new and novel insights into the Model 100. He collects some material that might go unnoticed, presents some manual information in a more usable format and does a good job on the "Bar Code Connection." Add depth to the exploration and *Exploring the Radio Shack Model 100* would be a worthwhile addition to your library. As it is, this book leaves almost as many blanks as it fills.

(CBS Computer Books, available from the author at 6914 Berquist Avenue, Canoga Park, CA 91307, \$16.95 plus \$2 S/H.)

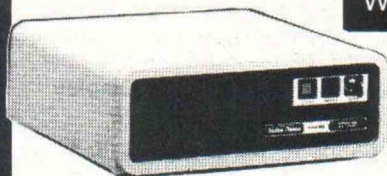
— Dennis Kirley

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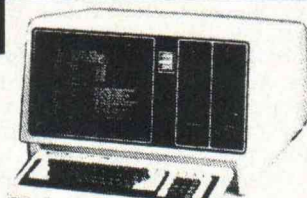
TANDY 1200



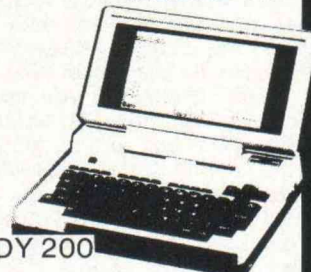
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TANDY 1000



MODEL 12



TANDY 200



MODEL 4-P



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on Snap-in™ Cartridge \$99.



Write ROM[®]

WRITE ROM is the definitive word processing extension for the Model 100. PCSG the first text formatter for the Model 100, now sold by Radio Shack as Scripsit 100. Now 18 months later PCSG introduces WRITE ROM. Those who have experienced it say WRITE ROM literally doubles the power of the Model 100.

First of all, WRITE ROM as its name implies is on a snap-in ROM. You simply take a quarter and open the little compartment on the back of the Model 100 and press it in. It is as easy as an Atari game cartridge. You can use other ROM programs like Lucid whenever you wish.

WRITE ROM lets you do every formatting function you would expect like setting margins, centering, right justifying and having headers and footers. But it does them under function key control.

WRITE ROM remembers your favorite format settings so that you can print a document without any setup, but you can change any formatting or printing parameters instantly with a function key.

WRITE ROM's "pixel mapping" feature shows you an instant picture on the screen of how your printout will look on paper.

In all there are 64 separate features and functions that you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formatted or not) to any other computer over the phone with just a function key. What's more it dials and handles sign on and sign off protocol automatically.

Third, WRITE ROM has a wonderful feature called Library that lets you record favorite phrases, words or commonly used expressions (often called boilerplate).

Any place you wish any Library text to appear you just type a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer.

Picture what you can do with that kind of capability.

WRITE ROM is blindingly fast. No one can claim faster operation. Because it is on ROM it uses virtually none of your precious RAM. It works with any printer, serial or parallel. You can make a duplicate copy of a document file under a new filename. Rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of the amazingly powerful piece of software. Dot commands allow control of such things as margins, centering, line spacing and other changes in the middle of a document. Most are Wordstar compatible.

A mail merge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature like superscripts that your printer supports in a way that many users say "is worth the price of the program."

To underline you don't have to remember a complicated printer code. You just type CODE U, and to stop underline, CODE U again. The CODE key is to the right of your spacebar. Boldface? CODE B to start and stop. Easy to remember and do. Five different printer features of your choice.

We couldn't list all the features here. For example, not just double space but triple or any other. You can use your TAB key in a document. WRITE ROM allows you to indent. This means you can have paragraphs that have a first line projecting to the left of the rest of the paragraph. Plus many more features.

WRITE ROM has a feature unique to any word processor on any computer. It is called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms or questionnaires.

With FORM anyplace where you had previously typed a GRAPH T and a prompt in a document, WRITE ROM will stop and you are shown that prompt on the screen. You can type in directly on the screen and when you press F8 you see the next prompt. Goes to a printer or a RAM file.

Think of how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could have his entire questionnaire. You could construct a series of prompts to answer correspondence typing the answers, even using Library codes. This feature lets you answer letters in rapid fire fashion each with personalized or standard responses.

Before WRITE ROM you had to be a programmer to create a series of prompts. Now it's as simple as GRAPH T.

PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature rich formatter for the Model 100. We are happy to offer WRITE ROM because it expands the 100 to a dimension of text processing you cannot equal on even larger computers.

We brashly state that WRITE ROM is the best you can buy. But put that to the test. If you aren't as excited as we are return it for a full refund. Priced at \$99 on snap-in ROM. MasterCard, VISA, American Express and COD.

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PCSG provides hotline software support for the Model 100. Call us at 1-214-351-0564

The following products recently have been received by PCM, examined by our magazine staff and approved for the PCM *Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be. This month the *Seal of Certification* has been issued to:

4N1-1000, a multifunction memory board. Has sockets for up to 512K memory (optional) and RS-232 serial interface. "Sattelite" modules, such as a clock and mouse adapter, may be added to the board. Requires Tandy 1000. *Micro Mainframe, 11285-E Sunrise Gold Circle, Rancho Cordova, CA 95670, (916) 635-3997, \$299.95.*

BUSS.BA, billing and time-keeping program that allows you to keep track of time and expenses and create bills from the stored records. Requires Tandy 100. *Ronald F. Burkart, Route 3, Box 883, Hillsboro, NC 27278, \$89.95.*

C-BUG, a debugging tool for BASIC programmers, dynamically traces memory variables in running programs. Requires Tandy 100. *Queue Software Systems, 4528 Bellevue, Suite 210, Kansas City, MO 64111, (816) 322-0936, \$19.95.*

Clip Art Collection Volume 1, a library of "clip art" pictures for use with *The Newsroom*. Includes over 600 pictures. Requires *The Newsroom*. *Springboard Software, Inc., 7808 CreekrIDGE Circle, Minneapolis, MN 55435, (612) 944-3915, \$29.95.*

dBASE II On-Disk Tutorial, guides the new user through the dBASE II database management system. Includes the book, *dBASE II for the First-Time user* by Alan Freedman. *Ashton-Tate, available through Radio Shack Computer Centers nationwide, 700-2603, price unavailable.*

Enchanter. You play a novice magician who is forced to battle with a dark and fierce power. You match your pow-

ers against an evil warlock. Requires Tandy 1000, 1200 or 3000. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, \$39.95.*

Infidel. You are a soldier of fortune searching for a great lost pyramid in the deadly Egyptian desert. All alone, you must enter the tomb and unravel its mysteries. Requires Tandy 1000, 1200 or 3000. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, \$44.95.*

Le Script, full-featured word processing system. Demo disk is available from manufacturer. Requires Tandy 1000, 1200, 2000 or 3000. *Anitek Software Products, P.O. Box 361136, Melbourne, FL 32936, (303) 259-9397, \$199.95.*

Magic Math Plus, a collection of recreational programs employing many different mathematical principles. Requires Tandy 1000, 1200, 2000 or 3000. *Recreational Mathematical Software, 129 Carol Drive, Clarks Summit, PA 18411, (717) 586-2784, \$27.95. Educational on-site licensing available for an additional \$50.*

MB-5150, "short" 512K RAM expansion card. Two memory banks can be filled with either 64K or 256K RAM chips. Requires Tandy 1200. *Micro Mainframe, 11285-E Sunrise Gold Circle, Rancho Cordova, CA 95670, (916) 635-3997, \$89.95.*

The Newsroom, allows you to create layouts for newsletters and newspapers. Paste up and print text, pictures and headlines. Requires Tandy 1000, 1200 or 3000. *Springboard Software, Inc., 7808 CreekrIDGE Circle, Minneapolis, MN 55435, (612) 944-3915, \$59.95.*

Odds Calculator for Draw Poker, a program designed to make you a winner at "Draw Poker." Using mathematical probability, the program and book help you make wise decisions when playing Poker. *Robert L. Nicolai, 4038 N. Ninth Street, St. Louis, MO 63147, (314) 621-7618, \$25 (documentation on disk), \$45 (printed documentation).*

PB-5150, parallel printer adapter and buffer card. Accepts one bank of either 64K or 256K RAM chips for buffer memory. Requires Tandy 1200 or 3000. *Micro Mainframe, 11285-E Sunrise Gold Circle, Rancho Cordova, CA 95670, (916) 635-3997, \$89.95.*

ProDesign II, a computer-aided drafting package. Allows users to design, manipulate and print detailed technical drawings. Requires 512K Tandy 1000, 1200 or 3000 with color graphics. *American Small Business Computers, 118 South Mill Street, Pryor, OK 74361, (918) 825-4844, \$299.*

The Ultimate ROM, three programs on a single ROM chip for the Tandy 100 or 200. Includes *IDEA!* outline processor, *T-base* database management, and *T-Writer* text formatter. Requires Tandy 100 or Tandy 200. *Traveling Software, distributed through Radio Shack Express Order, \$229.85.*

Wishbringer, an Adventure game program in which a magic stone helps you in your search for a kidnapped cat. You become entangled in the struggle between good and evil. Includes game paraphernalia. Requires Tandy 1000, 1200 or 3000. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, \$39.95.*

The Witness, an interactive fiction murder mystery game. You play a police detective searching for clues to solve the mystery. Game includes newspaper clippings, a book of restaurant matches and other such clues. Requires Tandy 1000, 1200 or 3000. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, \$39.95.*

Word Finder Version 2.1, a memory-resident synonym finder designed to be used with one of several supported word processing packages. Contains 90,000 synonyms for over 9,000 key words. Requires Tandy 1000, 1200, 2000 or 3000. *Writing Consultants, 300 Main Street, East Rochester, NY 14445, (716) 377-0130, \$79.95.*

By awarding a Seal, the magazine certifies the program does exist, but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to PCM's reviewers for evaluation.

Using *BAREAD 2.1*

Bar code listings must be read in numerical order beginning with Line 1 and continuing through the last line of the listing. The computer display is used to prompt you as to which line to scan and give you warning messages should you happen to get out of step.

When you run *BAREAD*, it asks you to scan the first line of the bar code listing. This line contains the name of the program as well as the beginning of the program itself. The computer will sound a high-pitched beep whenever it's ready for you to scan a line. After a line has been successfully read, you'll hear a lower beep. A "blip-bloop" sound prompts you to turn your attention to the screen for a message. You'll hear this when you accidentally scan a line out of sequence.

After reading the first line, you continue scanning with

the second line. Remember to wait for a high beep before scanning and then listen for a low beep to indicate a successful read.

Once the last line of the listing has been scanned, *BAREAD* will return control to the Tandy 100/200 menu screen. Note that the program you just scanned is now in the directory with a *.DO* extension.

The final step is to convert the *.DO* text file to a normal BASIC program. This is done quite simply by going to BASIC and loading the file with a command such as *LOAD "TEST.D0"* (if the program name were *TEST*). The program will load into BASIC and will be ready to run. To save the program in BASIC's compressed format (*.BA* extension), you'd type *SAVE "TEST"* (if the program were named *TEST*). You may then kill the *.DO* file with *KILL "TEST.D0"*.

BAREAD 2.1

```
1000 ' *** Initialize ***
1010 ON ERROR GOTO 1040
1020 CLEAR 1000:MAXFILES=2
1030 GOTO 1050
1040 IF ERR=5 THEN RESUME NEXT
1050 ON ERROR GOTO 0
1060 RUNM "B3OF9"
1070 OPEN "WAND:" FOR INPUT AS #1
1080 UC$=-1
1090 PC$="0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ- $+"
UVWXYZabcdefghijklmnopqrstuvwxyz-
```

```
1100 DIM RW$(36)
1110 ER$(1)="You must scan line 1 first!"
"
1120 ER$(2)="You've SKIPPED a line!"
1130 ER$(3)="You've ALREADY SCANNED this
line!"
1140 ER$(4)="Code not PCM2/39 format!"
1150 ER$(5)="Command not applicable here
!"
1160 ER$(6)="You cannot skip this line!"
1170 ER$(7)="Selected resume file not in
computer!"
1180 ' *** Read Reserved Words List ***
1190 DATA BEEP,CLEAR,CLOSE,DATA,DEFDBL,D
```

```

EFINT,DEFNG,DEFSTR,ELSE,GOSUB,GOTO
1200 DATA INKEY$,INPUT,INSTR(,LCOPY,LEFT
$(,LINE(,LOADM,LPRINT,USING,MAXFILES
1210 DATA MID$(,NEXT,PEEK,POKE,POWER,PRE
SET(,PRINT,READ,RESTORE,RETURN,RIGHT$(
1220 DATA SOUND,SPACE$(,STRING$(,THEN
1230 FOR I%=1 TO 36:READ RW$(I%):NEXT I%
1240 ' *** Procedure Begins Here ***
1250 CLS:PRINT@44,"PCM Bar Code Program
Reader v2.1"
1260 LINE(20,4)-(219,18),1,B:LINE(22,6)-
(217,16),1,B
1270 NN%=1
1280 GOSUB 1660:IF ER%>0 THEN GOSUB 1620
:GOTO 1280
1290 IF LL%=0 AND INSTR("YN",IL$)>0 THEN
ER%=5:GOSUB 1620:GOTO 1280
1300 IF LL%=0 THEN ON INSTR("ALSR",IL$)
GOTO 1820,1890,1980,2050
1310 IF LL%=1295 THEN 1350
1320 IF LL%<NN% AND NN%=1 THEN ER%=1:GO
SUB 1620:GOTO 1280
1330 IF LL%<NN% THEN ER%=3:GOSUB 1620:GO
TO 1280
1340 IF LL%>NN% AND NN%>1 THEN ER%=2:GOS
UB 1620:GOTO 1280
1350 IL$=RIGHT$(IL$,19)
1360 IF LL%=1 AND NN%>0 THEN GOSUB 1780
1370 CL$=CL$+IL$
1380 FOR I%=1 TO LEN(CL$)
1390   CH$=MID$(CL$,I%,1)
1400   IF CH$="*" THEN GOSUB 1510:IF NL
% THEN 1470 ELSE GOTO 1440
1410   IF CH$="/" THEN GOSUB 1550:IF NL
% THEN 1470 ELSE GOTO 1440
1420   IF CH$="." THEN UC%=NOT(UC%):GOT
O 1450
1430   IF CH$=>"A" AND CH$<="Z" AND NOT
(UC%) THEN CH$=CHR$(ASC(CH$)+32)
1440   XX$=XX$+CH$:IF RIGHT$(XX$,1)=CHR
$(13) THEN PRINT#2,XX$;:XX$="":UC%=-1
1450 NEXT I%
1460 CL$=""
1470 PRINT@200,SPACE$(80);
1480 IF LL%<1295 THEN NN%=LL%+1:GOTO 12
80
1490 ' *** Done ***
1500 CLOSE:CALL 61807!:CLEAR 500,HIMEM:M
ENU
1510 ' *** Decode Reserved Word ***
1520 NL%=0:IF I%>LEN(CL$)-1 THEN NL%=-1:
CL$="*":GOTO 1540
1530 I%=I%+1:CH$=RW$(INSTR(PC$,MID$(CL$,
I%,1)))
1540 RETURN
1550 ' *** Decode Hex and Control Charac
ters ***
1560 NL%=0:IF I%>LEN(CL$)-1 THEN NL%=-1:

```

```

CL$="/" :GOTO 1610
1570 I%=I%+1:IF INSTR("/%.",MID$(CL$,I%,
1))>0 THEN CH$=MID$(CL$,I%,1):GOTO 1610
1580 IF I%>LEN(CL$)-1 THEN NL%=-1:CL$=RI
GHT$(CL$,2):GOTO 1610
1590 HX$=MID$(CL$,I%,2):CH$=CHR$(INSTR(
"0123456789ABCDEF",LEFT$(HX$,1))-1)*16+I
NSTR("0123456789ABCDEF",RIGHT$(HX$,1))-1
)
1600 I%=I%+1
1610 RETURN
1620 ' *** Error Codes ***
1630 SOUND 5000,10:SOUND 8000,10:SOUND 5
000,10
1640 PRINT@220-.5*LEN(ER$(ER%)),ER$(ER%)
;
1650 RETURN
1660 ' *** Get Code Line ***
1670 PRINT@173,"";:PRINT USING "Scan lin
e ###";NN%
1680 IF NN%=-1 THEN PRINT@173,"Scan any
line":GOTO 1700
1690 SOUND 500,5
1700 INPUT#1,IL$:ER%=0
1710 FOR I%=1 TO LEN(IL$)
1720 IF MID$(IL$,I%,1)="!" THEN MID$(IL$
,I%,1)=". "
1730 NEXT I%
1740 IF LEN(IL$)<1 AND LEN(IL$)<21 THE
N ER%=4:RETURN
1750 IF LEN(IL$)=1 THEN LL%=0:RETURN
1760 LL$=LEFT$(IL$,2):LL%=(INSTR("012345
6789ABCDEFGHIJKLMNQRSTUUVWXYZ",LEFT$(LL
$,1))-1)*36+INSTR("0123456789ABCDEFGHIJ
KLMNQRSTUUVWXYZ",RIGHT$(LL$,1))-1
1770 RETURN
1780 ' *** Open Program File ***
1790 PN$=LEFT$(IL$,6):IL$=RIGHT$(IL$,LEN
(IL$)-6)
1800 OPEN PN$ FOR OUTPUT AS #2
1810 RETURN
1820 ' *** Abort ***
1830 BEEP:BEEP:BEEP
1840 PRINT@209,"ABORT! Are you sure?";
1850 INPUT#1,AN$
1860 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 1850
1870 PRINT@200,SPACE$(80);
1880 IF AN$="Y" THEN CLOSE:KILL PN$+" ".DO
":GOTO 1490 ELSE GOTO 1280
1890 ' *** Skip Line ***
1900 IF NN%=1 THEN ER%=6:GOSUB 1620:GOTO
1280
1910 BEEP:BEEP:BEEP
1920 PRINT@210,"SKIP! Are you sure?"
1930 INPUT#1,AN$
1940 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 1930

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1950 PRINT@200,SPACE$(80);
1960 IF AN$="Y" THEN NN%=NN%+1
1970 GOTO 1280
1980 ' *** Stop & Save ***
1990 BEEP:BEEP:BEEP
2000 PRINT@207,"STOP & SAVE! Are you sur
e?";
2010 INPUT#1,AN$
2020 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 2010
2030 PRINT@200,SPACE$(80);
2040 IF AN$="Y" THEN 1490 ELSE GOTO 1280
2050 ' *** Resume ***
2060 IF NN%<1 THEN ER%=5:GOSUB 1620:GOT
O 1280
2070 PRINT@254,"Resume Mode";
2080 NN%=1:GOSUB 1660
2090 IF LL%=0 THEN ER%=5 ELSE IF LL%<1
THEN ER%=1
2100 IF ER%>0 THEN GOSUB 1620:GOTO 2060
2110 PN$=MID$(IL$,3,6)
2120 ON ERROR GOTO 2140
2130 OPEN PN$ FOR INPUT AS #2:GOTO 2170
2140 RESUME 2150
2150 CLOSE #2
2160 ER%=7:GOSUB 1620:GOTO 1270
2170 CLOSE #2:OPEN PN$ FOR APPEND AS #2
2180 NN%=-1:GOTO 1280

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KEYS (FROM PAGE 35)

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Submitting Material To PCM

Contributions to PCM are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other Tandy Portable and MS-DOS computer owners. We now support the Tandy portable models 100, 200 and 600 and the Tandy 1000, 1200, 2000 and 3000 MS-DOS computers.

Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it.

Programs should be learning experiences.

Pay for submissions is based on a number of criteria. The rate of remuneration will be established and agreed upon prior to publication.

For the benefit of those who wish more detailed information on making submissions, please send an SASE to: Submissions Editor, PCM, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

If you feel qualified to review software and/or hardware products for computers covered in PCM, send us your name, address and phone number; we will send you a questionnaire form and a copy of our reviewer guidelines.

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Abort



Skip Line



Stop & Save



Resume



Yes



No

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Abort



Skip Line



Stop & Save



Resume



Yes



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Abort



Skip Line



Stop & Save



Resume



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Abort



Skip Line



Stop & Save



Resume



Yes



No

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 Florence Anderson News Co.
 Madison Madison Books

ARKANSAS

Fayetteville Vaughn Electronics/Radio Shack

ARIZONA

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 Livermore Software Galeria
 North
 Hollywood Levity Distributors
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 Sunnyvale Computer Literacy

DELAWARE

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 Wilmington Normar Inc.—The Smoke Shop

FLORIDA

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 N. Miami
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 Tallahassee Anderson News Co.

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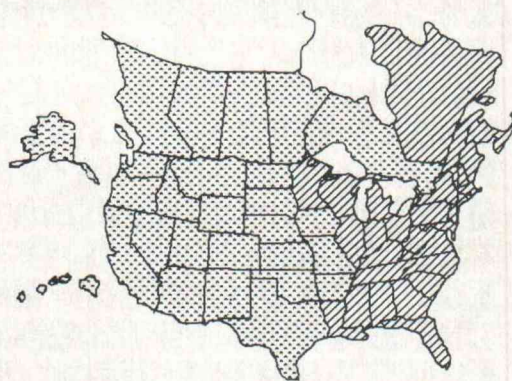
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are taking an interest
in a different type of programming

VCR

THE HOME VIDEO MONTHLY

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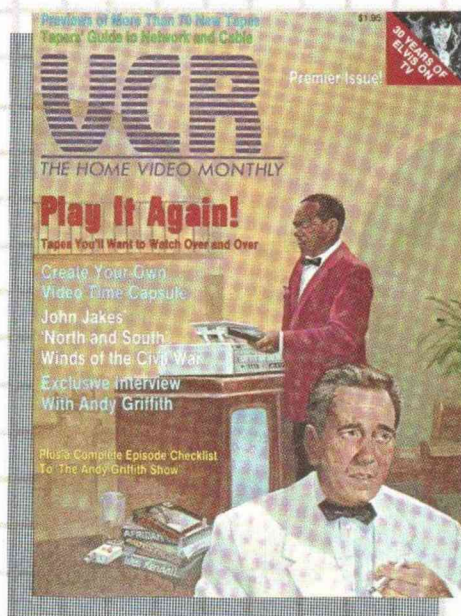
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you can turn to us for the answers to your questions, ranging from the trivial to the technical.

Even more, each month we will feature exclusive interviews with the stars and the star-makers, along with articles designed to help you relive some of your fondest video "memories" of the past.

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Write ROM — the definitive word processor for the Model 100. Function key formatting or dot commands. Search and replace. Library feature — inserts words, phrases or whole documents into text from just a code. MAP lets you see a picture of your document. In all there are 60 features and functions. No one can claim faster operation. FORM lets you create interactive forms with on-screen prompts that you can answer from the keyboard. Nothing else for the Model 100 compares with the features of Write ROM. Exactly the same as the Write ROM sold as a single program. Infoworld says it "makes the Model 100 a viable writing unit ... sur-

passed our highest expectations for quality and clarity."

Lucid Spreadsheet: This is the one PICO magazine says "blows Multiplan right out of the socket" and Infoworld performance rated as "excellent" and said "makes the Model 100 compute." Gives you features you cannot get with Lotus 123. Lets you build spreadsheets in your Model 100 that would consume 140-150K on a desktop. Program generating capability with no programming knowledge required. Variable column widths. Includes find and sort with function key control. It's fast, recalculates like lightning. No feature has been taken from the original, only new ones added.

Database: This is a relational data base like no other. You can do everything from mailing lists to invoices. No complicated pseudo-coding, you create input screens as simply as typing into TEXT. You are not limited by size; you can have as large an input screen as you wish. Prints out reports or forms, getting information from as many files as

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